CHEMICAL LIBRARY

GAS JOURNAL

LIGHT • HEAT • POWER • BYE-PRODUCTS

APR 10 1919 UNIV. OF MICH.

[Founded in 1849 as the "Journal of Gas Lighting."]

VOL. CXLV. No. 2911.] LONDON, FEBRUARY 25, 1919. [71ST YEAR. PRICE 8d.

OXIDE OF IRON
SPENT OXIDE
GAS PURIFICATION AND CHEMICAL CO., Ltd.
PALMERSTON HOUSE, LONDON, E.C. 2.
Telegrams: "PURIFICATION, LONDON."
Telephone: 9144 LONDON WALL.

PUMPING ENGINES
All Types for ACID, &c.
CAST-IRON OR STEEL TANKS
Any Capacity.
CHEMICAL PLANT.
Roofs and Girders. Structural Work.
Air and Gas Compressors.
MIXERS.
TAR STILLS AND CONDENSERS.
SULPHATE OF AMMONIA PLANT
W. NEILL & SON, LD.
Engineers, Iron & Brass Founders,
ST. HELENS JUNCTION.
Telegrams: 'NEILL, ST. HELENS.' Telephone No. 20.

PURIFYING MATERIAL
"Brownox-de-Luxe."
Unqualified Satisfaction given where used.
SPENT OXIDE PURCHASED
J. BROWN & CO., Ltd.
Savile Town, DEWSBURY.

TORBAY
JOINT STOPPING
FREE FROM LEAD.
The TORBAY PAINT CO.,
26/28, Billiter St., LONDON, E.C. 3.
39/41, Old Hall St., LIVERPOOL.

"BLUEBELL"
SILICA RETORTS
(95% SILICA)
John G. Stein & Co., Ltd.,
Castlecary, SCOTLAND.

Makers of
GASHOLDERS,
TANKS (C.I. or Steel),
PURIFIERS,
WASHERS,
ROOFS,
&c.
ASHMORE, BENSON, PEASE & CO., LTD.,
STOCKTON-ON-TEES.
Complete GAS WORKS
London Office
32, Victoria Street, Westminster, S.W.
Telegrams: "GASHOLDER."

JAMES McKELVIE & CO.
Coal Owners,
Gas and Steam Coal Contractors,
17, RUTLAND SQUARE, EDINBURGH.
50, MARK LANE, LONDON, E.C.
GUILDHALL CHAMBERS, SANDHILL, NEWCASTLE-ON-TYNE.
24, CHAPEL STREET, LIVERPOOL.
ESTABLISHED 1840.

W. & B. COWAN
(Incorporated in Parkinson and W. & B. Cowan, Ltd.),
LONDON. MANCHESTER. EDINBURGH. GLASGOW.
SYDNEY. MELBOURNE. BRISBANE. WELLINGTON, N.Z.
(See Advertisement on page III. of Wrapper.)

STEWARTS AND LLOYDS, LIMITED, 41, OSWALD STREET, GLASGOW. BROAD STREET CHAMBERS, BIRMINGHAM.
TUBES & FITTINGS for Gas, Steam, Water, &c.

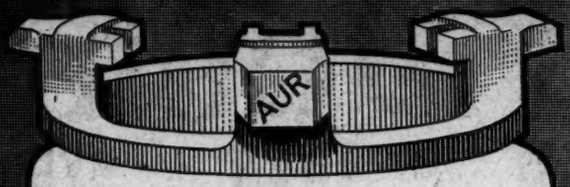
ESTABLISHED — 1861 —
Telegrams: "DRY METERS, LONDON."
Telephone: KENSINGTON, 1140.

George Glover and Co., Ltd.
RANELAGH WORKS
Royal Avenue, Chelsea
LONDON, S.W., 3.

Highest Awards at the Principal International Exhibitions.
Branches at LEEDS (9, Dewsbury Road) and MANCHESTER (Gaythorn Meter Works, Easton St.).

SPECIALISTS IN DRY GAS METERS—SLOT, KEY, AND ORDINARY.
Every meter leaving GEORGE GLOVER AND CO.'S works, irrespective of size—and they build up to 3000 Lights—is regulated and tested for soundness at 12 in. pressure, and for registration not only at the ½ in. pressure prescribed by the "Sales of Gas Act," but at 3 in. pressure with full outlet capacity, so as to prevent "slow" registration even when the meter is overworked.
AGENTS FOR THE PATENT M. & M. SELF-LOCKING SLOT METER PADLOCK.

R. & J. DEMPSTER, LTD., ELSWORTH HOUSE, BROADWAY, WESTMINSTER, S.W. 1. MANCHESTER.
"NOTTA NOB" FAN ADM. DUKE STREET & COAL WASHER.
MEAD, WRIGHTSON & CO., LD. SOLE MAKERS OF THE
RITCHIE CI PIPES FOR GAS & WATER. MIDDLESBROUGH.



The Welsbach Light Co., Ltd.

THE WELSBACH LIGHT CO., LTD.

Welsbach House,
KING'S CROSS,
London, W.C.1

There Are No Better Mantles Made

is an ALL British Company

The Welsbach Factory produces the largest number of Mantles of all Factories in the United Kingdom.

DONKIN

for

DISTRICT SERVICE GOVERNORS

HIGH AND LOW PRESSURE SERVICE REGULATORS METER REGULATORS,
STOVE AND LAMP REGULATORS, SERVICE CLAMPS AND FITTINGS.

THE BRYAN DONKIN COMPANY, LTD.,

Head Offices & Works, **CHESTERFIELD.**

LONDON OFFICE: 3, VICTORIA STREET, WESTMINSTER, S.W. 1.

Chesterfield Telephone No. 84.
London Telephone No. 5358 Victoria.

Chesterfield Telegrams, "Donkin, Chesterfield."
London Telegrams, "Donkin, Vic. London."

GAS JOURNAL

LIGHT · HEAT · POWER · BYE-PRODUCTS

[Founded in 1849 as the "Journal of Gas Lighting."]

EDITOR & PUBLISHER: WALTER KING. OFFICE: 11, BOLT COURT, FLEET ST., LONDON, E.C. 4.

VOL. CXLV., No. 2911.] TUESDAY, FEBRUARY 25, 1919. [71ST YEAR.

EDITORIAL NOTES.

A Powerful National Gas Council Established.

THE gas industry has parted with the old National Gas Council, and established and set in motion the machinery of the new one. This machinery requires a little modification here and there; and there are auxiliary parts to be supplied—such as the permanent staff and suitable offices, which work has been handed over to a Special Committee for attention. Never before has the gas industry possessed such a powerful organization; and it badly wanted it. All told, there are in its membership 425 concerns—company and municipal. There are many hundreds of undertakings still outside; but the 425 that have combined represent no less than 82 p.ct. of the gas output of the United Kingdom, and an income for the Council of approximately £7000. This representation is something to think about. It is something on which to congratulate the originators of the reformation—especially the one from whose brain emanated the scheme which has proved acceptable to the producers and distributors of so large a part of the gas consumption of the industry. But if numerically there are more undertakings outside the new Council than in it, the fact that they represent only 18 p.ct. of the gas output of the United Kingdom should be a good reason for them associating themselves with those who are much stronger. Such association means for them added strength, and greater resisting power. In their own interests, self-exclusion would be a mistake; and an equally grave error would be for them to think they are not wanted by the larger gas undertakings. The larger undertakings do want them. The cause of perfect unity and a completely solid front would be a sufficient reason; but there is a still more potent one. It is that frequently attack and change have, as Mr. D. Milne Watson has so well put it, commenced at the small end of the stick; and through the inability of the small undertaking to offer, standing alone, sufficient resistance, grievous harm has been done to the whole industry. The National Gas Council, in the interests of all gas undertakings, wishes to protect the small ones against the wily strategy which sets up precedents and effects its ends in the weakest parts of the industry. Therefore, for the good and for the protection of the whole of the industry, the 82 p.ct. should become, and that quickly, 100 p.ct.

The strength of the new Council, and the appeal to the smaller undertakings, are the two points to which greatest prominence is given here. There are other important matters to be dealt with. Before mentioning them, it should be stated that the new Council, with its greater power and vitality, does not forget all that it owes to its precursor. Last Tuesday as the affairs of the old Council were being wound-up, and the new Council formally brought into being, and charged with the imposing duties that await it, there were very sincere thanks to the former for all it has done, and for all it has attempted to do, during the exigent times through which we have been passing. There were also warm thanks to the veteran President (Mr. H. E. Jones), who is not taking office again, but who places himself unreservedly at the disposal of the Council for consultative purposes. His presence helped to stabilize the old, defectively organized Council; and his encouragement was highly valuable. His influence has been an asset in the organization of the new body. But Mr. Jones has fallen into self-depreciating habits, which his friends are not prepared to tolerate. He is frequently talking of an age now which he does not look, and which his acts would belie if, glancing backwards, his words were not confirmed. What his friends are prepared to do is to regretfully concede that his years of professional life entitle him to all the possible leisure which his more immediate interests in the industry can spare him. However, in what he termed his "valedictory remarks" last Tuesday, he gave the new Council his benison, and wished it "god-speed," under its unanimously-elected President, Mr. Milne Watson, the Governor of the Gas Light and Coke Company, who has also been appointed Chairman of the Central Executive Board. Mr. Jones himself proposed the election of Mr. Milne Watson. Position and loyal work during the years of the war would not permit any other name being submitted as the first President of the new Council. But the position is not one that is to be held by any prescriptive or other right. The present occupant believes in such honours being distributed. This belief is one that up to a point is right enough. But the new Council is not an ordinary organization. It has a variety of purposes; and the occupant of the presidency must be no mere passive figure-head. A nimbus of honour and respect may be about his head; but we cannot fail to realize, and far more so in these times and those before us, that the work attaching to the office must be of a somewhat onerous nature. Therefore, there was wisdom in the proposal of Mr. Jones, as well as in the ratification by the Council, that Mr. Milne Watson should be placed in the presidency. For the old Council has left a heavy legacy of uncompleted work—not due to any fault of their own, but to external forces beyond their control. No man knows so much about the work, nor has had so much to do with it, as the new President; and no man can take such measure (so far as there can be any measure) of what lies ahead as one who lives in modern development and change on the scale of the President.

The industry has accomplished a grand piece of work in the creation of this new organization. It has given itself at once a base and an active force with large potentialities; and if it does not make the utmost use of its own institution, it will have no one to blame but itself. It is all in its own hands now. The men who will operate in its central part are there by the request and desire of those who are members of the whole body—that is to say, if the elections to the Central Executive Board have all been made by those responsible administratively for the conduct of the gas undertakings concerned. Here must be expressed a little disappointment. We had hoped that the Central Executive Board would have had upon it a larger proportion of the administrative side of the gas industry as distinct from executive officials; seeing that in matters of policy the direct expression of view and mandate of those in supreme authority are of the greatest importance. But from some districts, all gas engineers and no administrators have been sent to the Central Board; and this has been done to such an extent that on the Board itself the gas-engineering element has a large preponderance. This is not a criticism of ability or knowledge, but of composition, because of the feeling that on the Central Executive Board all interests from each district should be assembled. There does not seem to have been very much method followed in making the elections to the Board. It would have been decidedly better if there had been an attempt to secure a balance of administrative and official representatives, with due regard to company and municipal ownership.

However, this is a matter that should be corrected as early as possible by the District Executive Boards; and we hope the point will be taken into consideration with any divisioning which some of the districts will in all probability undergo almost immediately. In principle, it has been decided that Yorkshire and Lancashire shall be disunited, and

each constitute a district. Other territorial alterations are in contemplation, owing to a want of identity in certain respects. This will afford an opportunity to give a better lead in the matter of constitution and administrative leavening in respect of future elections. In his celebrated speech in Paris on the League of Nations, President Wilson made this remark: "When it came to a question of determining " the character of representation in the body of delegates, " we were all aware of a universal feeling that the world " cannot rest satisfied with mere official guidance." There is nothing in this derogatory to anyone. What is wanted in the League of Nations is also wanted in the National Gas Council—the very best intelligence, with experience and knowledge on the great diversity of matters (not purely engineering or chemical) which will have to be dealt with by the Council; and, forsooth, the list of matters that press their claim for immediate consideration is a formidable one. The President was outspoken on the subjects of coal, coke, the financial grievance, and electricity; and Mr. R. G. Clarry brought before the meeting a matter of considerable importance when he introduced the question of uniformity of action between gas undertakings. Disuniformity has been a weakness, and the cause of much ill-doing to the gas industry generally.

As already said, the new Council is a powerful organization; and we trust that its efficiency will be in proportion to its power. It is for those directing the gas undertakings that are members to see that it is, and in this every gas undertaking can do its part. Given the necessary co-operative assistance, we look forward with much confidence to the Council doing a large part in making history for an industry with great inherent qualifications for a progressive future.

Committee of Gas Employers.

ALTHOUGH there are members of the new National Gas Council who are not members of the separate Committee of Gas Employers, it is a satisfaction to know that a considerable majority of the Council have become members of the Committee. In the circumstances of the times, they are wise. In other circumstances, we should have said that the far better plan is for every undertaking to deal direct with every question which arises with its employees. But it is labour and not the employers who have shaped the methods by which matters are to-day negotiated and settled; and the employers have to accept the position. In the gas industry, however (through its operations being spread all over the United Kingdom, and not concentrated in one or more areas), matters fall into two distinct groups. There are some which are of national application; there are others which must be varied in degree through geographical differences. Some of these it would be distinctly unfair to the men in one locality to have dealt with on the same basis as must be adopted in other localities; and to deal with the men in the latter on the basis of those in the former would be to give them, in their local conditions, an undue advantage. The leaders of the Unions concerned, being men of intelligence, we believe, fully realize this. Therefore, those matters that are influenced by local conditions will be dealt with by the District Sections of the Committee; while all questions of national import will be handled by the Central Committee. Local conditions supply one reason why there must be a certain readjustment of the areas as first provisionally arranged; and in this connection it is better to get on to an acceptable basis first as last.

Really we cannot understand, in the circumstances which have been forced upon the industry, as in other industries, why all gas undertakings do not belong to the Committee. It only means that force will, if necessary, be individually applied by the unions to them to compel them to fall into line with agreements that are made, as witness the levelling-up that will have to take place in connection with already existing agreements. There are some gas undertakings that have held back. But the unions are already on their track; and they may be certain that they are not going to escape. Anyway, with the unions organized to the extent that they are to-day, it is better that there should be complete organization of employers. Never was the old adage "Union is Strength" more applicable than in these times. But, of course, the best union of all is that of employers and employed. This is the ideal which, though it has been largely effected in some cases, is in them still subject to external decisions. At the same time, given even a separate union of employers and a union of employees, the ground is provided for conference on terms of equality; and through such conference there must come mutual education, which should be an advantage, and should help to bring about better understanding as to the relative position. We can see the possibility of much good arising from such conferences. The old order of things which kept employees or their representatives at arm's length from employers, only engendered on the employees' side the belief that there was a division of interest which was to their own disadvantage. Mutual conferences will not at once break-down this feeling; but even the feeling is subject through improved knowledge to the process of detrition.

Regarding the position of matters in the gas industry, there are the applications for a 10s. increase in wages and for a 44-hour week. These applications show the futility of individual undertakings entering into premature agreements on their own account; inasmuch as, if through combined action somewhat better terms are secured elsewhere, the men in the works where the separate settlement has been made are not going to be content while the men at neighbouring works are doing better. On the other hand, if the men at one works independently secure better terms through the leniency or the generosity of their employers, it follows that these terms will sooner or later be asked for on behalf of the workers at other places. A considerable amount of harm has been done by independent action; and this is something which should be voluntarily stopped. The same with sectional changes in pay and conditions. Men in gas-works are not all members of the General Workers' Unions. There are those who belong to other trade unions. For comfort and straight working, it is essential that there should be no overlapping of changes; that the changes that are made (especially in connection with "war" pay) should synchronize. Through these changes not synchronizing, improvements in the pay and conditions of one class of men only result in other classes wanting fresh terms. When these are settled, the first class consider they are entitled to more. So the vicious process continues; and disturbances seem to be interminable. However, on the immediate questions of pay and hours, the application for 10s. advance, it was agreed should be referred to arbitration. This took place last Thursday; but the award has yet to be made. The matter of levelling-up to bring works that have not yet adopted previous agreements is one for the District Committees of the Committee of Employees. The question of the forty-four hours week is to be discussed by delegates from the side of the gas industry and from that of the men. There can be no strong claim for this, nor do we believe there is, in the gas industry. The eight-hour day has long been established; and some gas-workers still prefer the twelve-hour day. In a continuous process such as that of coal carbonization for gas making, it is inconvenient to divide the day into anything but aliquot parts; and the eight-hour shift is the most convenient of the divisions that can be made. Consideration should be given by the unions to the peculiarity of the gas industry; and credit should be accorded it for having, so long ahead of most industries, conferred upon its men the benefits of the eight-hour day. No one can say that the industry has not proved itself to be an excellent and considerate employer. There may be parts where the contrary has obtained; but these parts are the exception, and not the rule.

The Gas of the Future.

IF there were no differences of opinion in mundane affairs, things would go very flat; and moreover it is only, in many matters, through differences of opinion that the truth is ultimately reached. We have lately had the case presented in our columns by an engineer for the supply of gas having a calorific power of 550 B.Th.U. per cubic foot. But no enthusiasm appears to have been aroused by it among our technical readers; the reason probably being that the trend of technical opinion has very largely veered round to making as much as is reasonably possible out of every ton of coal carbonized, in order to realize the economy of which the industry stands very much in need. There are those who are favourable to the retention of high calorific power gas and (as things are going) relatively low makes of gas per ton, without utilizing any of the coke produced for the making of water gas, and to allowing the benzol to remain in the gas, giving it only a 5 p.ct. advantage in calorific power, while the substance is more valuable to the country for power than for heat. A correspondent in this issue of the

"JOURNAL" incidentally indicates his view that, if those who are of these opinions would think in terms of B.Th.U. for a penny, instead of in terms of B.Th.U. per cubic foot, their views would in all likelihood undergo modification. The differences of opinion, and in point of view, are all to the good, because they force investigation in the quest for proof along roads which must ultimately end in common agreement.

The gas industry has, however, to produce economy; it has to supply gas at the lowest possible price; it has to have regard to the fact that the largest unoccupied territory before it is that of domestic and industrial heating, and that price is going to be a factor there. It has to gauge what is likely to be the normal market position of coke, and with a larger production; and it cannot neglect any means of profitably utilizing it. It has to consider, among other probabilities, the future commercial position of sulphate of ammonia. It has to mark the Government action in connection with electricity, and the forces that are at work in this direction. This is highly important. Those in the gas industry who read the complete report of the conference between the Prime Minister and the miners' leaders last week will not have failed to notice how things are moving, without any reference to the gas industry. Mr. Smillie told the Prime Minister that, up to the present time, the country has only been realizing from 10 to 15 p.ct. of the actual thermal value of the coal produced by the miners. A better use of the coal, he holds, will cheapen the raw materials of other industries, and make our atmosphere cleaner and healthier. These are the directions in which the leader of the miners thinks savings might be effected in order to pay the miners higher wages. That other people should gain by developing methods of better utilizing coal is something which cannot be contemplated by him. The Prime Minister gave his assurance that the matter raised by Mr. Smillie was part of the scheme of the Government, and that they were setting up a Ministry for the purpose of dealing with it. There is much that is significant in these statements. The Prime Minister, we take it, had in view the plans that are being developed for electricity supply; and it is evident that Mr. Smillie had not in mind—seeing he mentioned only 10 to 15 p.ct. of the thermal value of the coal—the efficiency that the gas industry already produces, let alone the efficiency of which it is capable if given greater liberty. It is a striking development for the miners to be taking any interest in the manner in which coal is used; inasmuch as the more wasteful its use, the greater the extent of employment in the mining industry. This, however, in passing. Mr. Smillie should read, mark, learn, and inwardly digest Prof. Cobb's recent article in the "Edinburgh Review." He might then use some of his influence on behalf of the gas industry.

It is the still higher efficiency in the use of coal which the gas industry desires to bring into account. For a great number of years Mr. Charles Hunt, the Chairman of the South Suburban Gas Company, has held the belief, and has sought to quicken the pace to its materialization, that the progress of the industry in economy and efficiency is to be found in no small measure in the coal it brings under treatment; and this belief is to-day as strong in him as ever. At the meeting of the proprietors of the Company last Friday, he referred to the steaming of retort charges and to the use of blue water gas. He declared that he is keeping an open mind on the subject of gas quality. But he added: "It is permissible to hope that regard will be had to the "manifest advantage of distributing coke in the form of "combustible gas, and to the equally manifest advantage "from a national point of view of extracting benzol from "the gas, if this can be done without prejudice to the con-"sumer." This completely discloses the formed judgment of the speaker on these topics, though still maintaining an open mind, and notwithstanding the loophole provided by the clause commencing with "if." The "prejudice" to the gas consumer for heating is (such as it is) well established; and the consumer's gain is to be found in the relatively lower price at which the gas can be supplied to him. We get an accentuation of Mr. Hunt's views when he proceeds to say that it really needs but little stretch of the imagination to picture the gas of the future—possibly of the near future—as being completely deprived of its illuminating constituents, and therefore capable of being stored by compression without injury to its quality, with other attendant possibilities. "Possibly in the near future!" The Board of Fuel Research are about to report to the Board of Trade, if they have not already done so, on the subject of gas composition; and the Gas Investigation Committee's research staff are at work at Uddingston investigating the virtues of steaming the charges in continuous vertical retorts.

Gas Workers' Wages Arbitration.

The arbitration regarding the fresh application for an increase of wages—10s. per week—that has been made on behalf of gas-workers took place last Thursday afternoon. On inquiry, we learn that the Arbitrators were Colonel Denny, Mr. F. J. Button, and Sir W. Mackenzie. The case for the gas industry was presented very completely by Mr. W. B. Clode, K.C. The decision of the Arbitrators was deferred.

Benzol and Motor Users.

The anxiety of motor car users that the producers of benzol shall continue the practice of scrubbing their gas is well exemplified by the letter which we publish this week from Mr. Stenson Cooke, the Secretary of the Automobile Association and Motor Union. He could not, from the Motor Users' side, put the case with greater emphasis than when he says: "We are strongly of the opinion that even the smallest companies should receive direct Government encouragement to scrub their gas for benzol." Benzol is growing in favour among motor car users. Their old preference for petrol is being worn-down by experience. In a letter by a "Manufacturer" in "Motor," reference is made to the superiority of benzol over petrol; and the writer is convinced that to any motorist who understands his car thoroughly, benzol is worth at least 9d. per gallon more than petrol. When he says "petrol," he does not mean the war rubbish, but the pre-war material.

Gas Coal Stocks Position.

It is reported by the "Iron and Coal Trades Review" that according to the latest list issued from the Coal Controller's Department, there is a slight improvement in the position of reserve supplies at gas-works. The list shows that 93 works had less than one week's supply in sight (including 25 with less than three days'), and 88 had less than two weeks. Our contemporary thinks the list to be issued this week should show further improvement, which will continue so long as there is no interruption in the output. The decreasing lighting hours and the change in the temperature are welcomed at gas-works that are suffering extreme shortage.

The Coal Miners and the Country.

The miners' ballot has gone strongly in favour of a general stoppage on March 15; but the situation at the moment looks a bit more hopeful. The conference which the miners' representatives had with the Premier last week appears to have cleared the air somewhat. His offer that a Royal Commission should be immediately appointed to report on all the matters that have been raised by the miners, and that the Commision should report on the question of hours and pay by March 31, is so obviously fair, that the Executive of the Miners' Federation have, it is understood, resolved to leave, without recommendation on their part, the acceptance or rejection of the offer to the meeting of delegates which has been called for to-morrow. If there is acceptance, then the stoppage (if there is to be one) will be deferred until the end of March. The leaders, it seems, are beginning to see that their high-handed coercing threat has raised general indignation throughout the country; and while it would be absurd to suppose that the leaders are not fully aware of the violent injury that their suggested extreme action would inflict upon the country, and upon every class of worker in it, plain speaking has had some effect. The sentimental talk there has been on behalf of miners already well paid does not stand much analytical inspection. For instance, the leaders know perfectly well the men would not have made a claim for a six-hour day, if if it were not on the basis of present pay. Mr. Smillie also speaks of raising the standard of the miner's life. However much money the miners get, they do not generally bestir themselves with the view to realizing a higher standard of life; the more intelligent ones perhaps do. But the way miners are going to work suggests a reduction and not a raising of the standard of living for themselves and everyone else. It is reported that the

colliery owners are proposing to put forward a plan before the Royal Commission whereby the miners and themselves will jointly exercise control over the finances of the coal industry and the management generally. It is believed this will effectually stop all trouble. The whole country wishes to goodness it would. Another welcome sign is that the Executive of the Miners' Federation have decided to be represented at the National Industrial Council Conference on Thursday.

Works Committees.

In the "JOURNAL" for Jan. 7, we reported a development of the co-partnership system at the works of the South Suburban Gas Company. The Co-Partnership Committee, it will be remembered, are now also the Works Committee; and as such they take into consideration all questions or difficulties which arise in which the men are concerned. It is a system that should commend itself to the managements of all gas-works; and it is, as a matter of fact, having extended consideration, with the result that we are anticipating news of other works adopting the same method of making smooth the rough places that are bound to occur occasionally in any works where large numbers of men are employed, particularly in such storm-tossed times as these. The South Suburban development (which had its like previously at the South Metropolitan Gas Company's stations and which also incorporates the idea underlying the Whitley recommendations) has already done good work; and the Chairman (Mr. Charles Hunt) was able to tell the proprietors, last Friday, of his satisfaction over its operation. The plan should also commend itself to those who are sincerely trade unionists, and whose minds have not become possessed by the doctrine that settlement can only come by force. The easiest course to the settlement of difficulty is the right one; and of this both employers and employed have made a long stride in appreciation.

Capital Issues.

It appears that capital issues are not to be free from control during the reconstruction period. How long the "reconstruction period" is going to last is not known. Anyway, control is to be somewhat relaxed, and facilities given for supporting applications. The gas industry should be able to make out a good case in view of the reliance upon it not only of the general public, but of many industries. It cannot reconstruct, develop, or improve its position in relation to coal conservation, and the cheapening of its products, without some considerable expenditure. The Government, it seems, are being guided in its continued control of capital issues by the Reconstruction Committee on Currency and Financial Facilities, as the importance is realized of preserving for undertakings essential for the speedy restoration of commerce and industry, and the development of public utility services, an adequate share of the capital which is available for investment. Fresh issues are therefore to be prohibited, except under licence. Applicants are to be given the opportunity of stating their cases orally before a Committee—an extension of the Capital Issues Committee—of which Lord Cunliffe is to be the Chairman.

Coke Handling.

More attention must in future be paid to the handling and treating of coke. The handling has at times had a considerable amount of consideration given to it, in order to reduce the manual work entailed. But up to a certain stage the trend of development has produced higher liabilities for wear and tear of plant, and an undue contribution to the yield of breeze and to the moisture content of the coke. Also where hot-coke conveyors are in use running lengthwise of the retort-benches, the steam and dust have been anything but conducive to the most comfortable conditions in the retort-house. The telpher and the skip improved matters; but there were still the questions of quenching, the production of breeze, and the inordinate moisture content. The planning of the skip-runs lengthwise of the house has also its objectionable features in some cases. There are valuable practical suggestions as to new methods of treatment in the paper which Mr. C. J. Woodhead, of Huddersfield, read before the Manchester and District Junior Gas Association on Saturday. The suggestions are based on developments made at both Manchester and Huddersfield, whereby the detracting features of the older forms of plant are obviated, and an improved coke is obtained. The details will be found in the paper. But skips for receiving the hot coke, its transfer to inclined quenching tables outside, and its removal from them after the completion of the draw—at once points to the advantages of relieving the house from steam, of giving a well-drained clean coke with the minimum of moisture in it, and of the plant which removes it from the quenching-table being only at work at full capacity for the time it takes to clear away the drawn coke. The two plants are not alike; but the one id is in both, excepting that, in the case of the Manchester plant the coke is taken to the quenching-table direct from the exit side of the retort-bench instead of running lengthwise of the house, and out at the end. This brief indication of contents will induce readers to dip deeper into Mr. Woodhead's paper, which comes opportunely when gas engineers are considering the questions of reconstruction and extension, though looking ruefully at the current costs of materials.

THE MINERS AND COAL CARBONIZATION.

WHAT may prove to have been a very fateful conference between the Prime Minister and the leaders of the miners last week contained many notable points and incidents. Not the least interesting is the following little piece of colloquy:

Mr. ROBERT SMILLIE: The coal trade of this country has called the attention of the nation and of the Government to the fact that up to the present time we have only been securing 10 to 15 p. ct. of the real efficiency of the coal produced from the mines. When you are burning coal, either in the domestic grate or for steam-raising, or for any other purpose, we are really burning the lives of men. It is not, I think, to the credit of this nation that we should have gone on down to the present time. We have the knowledge, and we can use the means, if we care to, of securing at least three times the efficiency from a ton of coal which is being secured now. It will do many things. It will cheapen our raw material for other industries; it will be more cleanly in its use; and it will clear our atmosphere of the health-destroying soot which is continually hanging over our villages. We know this will take some time; but we feel that this is the direction to which what are called the captains of industry in this country should give attention rather than the reducing or the keeping down at a very low point the wages of the men and boys who produce the coal. I feel sure the Government will take this matter in hand.

The PRIME MINISTER: That is part of the scheme of the Government. That is one of the reasons why we are going in for such economies. As a matter of fact, the Cabinet were considering it last night.

Mr. SMILLIE: Yes; but our fear is that you are going to let it drift into private hands again.

The PRIME MINISTER: No, we are setting up a special Ministry, and that Ministry is to undertake the development on behalf of the State.

Temporary Increase of Charges Act.—An application has been made to the Local Government Board by the Stoke-on-Trent Corporation for an Order under the Statutory Undertakings (Temporary Increase of Charges) Act, 1918.

Coke Supplies of France.—The deficiency in the coke supplies of France before the war, says a writer in "La Métallurgie," was some 3,000,000 tons per annum, which has now been increased to 7,400,000 tons, with the recuperation of Alsace-Lorraine, but will be reduced to 6,100,000 tons with the occupation of the Saar coal district. The writer estimates that the gas-works in the country will be able to supply some 2,800,000 tons of coke per annum, and suggests that until the necessary number of coke-ovens are completed, Germany should be called upon to furnish the balance of 3,300,000 tons, which could easily be spared from her annual output of 30,000,000 tons.

Cooling Gas-Engine Cylinders.—A writer in "Power Plant Engineering" draws attention to the fact that experiments conducted by the late Prof. Hopkinson have demonstrated that the difficulties incident to jacket-cooling can be overcome by cooling the cylinder from the inside by means of water-jets. Cold water is injected through a hollow casing projecting into the combustion chamber, and provided with a number of holes or small nozzles about 1/32-in. in diameter. The jets are directed to all parts of the surface of the combustion chamber and against the face of the piston. Difficulties of corrosion and lubrication are overcome by regulating the quantity of water in such a way that the temperature of the cylinder is kept well above 100° C. For practical purposes, the heat-flow during the last three-fourths of the stroke is so small that direct cooling of that portion of the cylinder can be dispensed with, and it is sufficient to cool the surfaces of the combustion chamber and head of the piston only. A simple single-walled casting can be used for the cylinder, resulting in a great saving in weight and cost, and in improved reliability by the elimination of casting stresses.

PERSONAL.

At the annual meeting last week of the Newcastle and Gateshead Gas Company, the salary of the Secretary, Mr. T. P. RIDLEY, was increased by £250. Following upon the death of Sir W. H. Stephenson, the Directors have elected Mr. JOHN E. COWEN Chairman, and Mr. J. H. B. NOBLE Deputy-Chairman.

Lieut. H. D. LUMB, R.A.F., has resigned his position as Engineer and Manager of the Brentwood Gas Company, and Mr. W. S. VENNER has been appointed as his successor.

The appointment of Engineer and Manager to the Seaford Gas Company has been given to Mr. DAVID MUIR, of Tyldesley.

Mr. J. K. HARRISON, of Monaghan, has been appointed Manager and Secretary of the Armagh Gas Company, on the retirement of Mr. JAMES WHIMSTER.

OBITUARY.

SIR GUY CALTHROP, BART.

With much regret we have to announce the death of Sir Guy Calthrop, Bart., the Coal Controller, on Sunday afternoon, at a nursing home in London. He had been suffering from influenza, and pneumonia supervened with fatal results. It was in February, 1917, that Sir Guy was called upon to undertake a task which only a man of strong nerve and courage would have been willing to engage upon. He faced it; but more than once he was heard to say, when people were complaining over his course of action, that anyone else who thought he could do the "job" better was welcome to it. In connection with coal control, there were so many interests to serve, both at home and abroad, and the ramifications of the business were so vast, that it required a man of great skill and diplomacy to get them all to harmonize, or even to approach the semblance of harmony. The men of the gas industry knew Sir Guy. They knew him for a straightforward man, who was trying to do his best under conditions which consistently opposed, and did not assist, him. While most of us, looking at things from our own single point of view, and not from the hundred-and-one points of view that Sir Guy had to take, considered that some of his plans and decisions were not exactly what they should have been, we could not fail to realize that he was the man behind the scenes, and that we, his critics, were not. For him, it was a continuous battle with progressive difficulties, which the miners did little to lighten. His last two years' work was a large one, and sufficient to break-down the hardiest of spirits. All that he did to assuage the troubles of the country and of its Allies, we shall remember with gratitude.

The Directors of ALDER & MACKAY, LTD., desire to make acknowledgment, and to convey their thanks for the expressions of sympathy they have received from friends connected with the gas industry in every part of the country at the lamented death of their Director, Mr. ANDREW MACKENZIE. The letters have been so numerous that it has been impossible to acknowledge them individually; but all friends are very sincerely thanked.

Stream Pollution by Large Gas-Washers.

Some eighteen months ago, a blast-furnace plant was put in operation in Virginia, for producing ferro-manganese for the National Government. The gas generated in the furnace, which contains a considerable percentage of carbon monoxide, is used partly as fuel under the boilers; but the remainder is washed with water in two towers arranged in series, and burned at the stoves which heat the air for the blast. The spent water from the towers was discharged into a neighbouring stream, famed for its trout. The blast-furnace had been in operation only a short time when thousands of dead fish appeared on the banks and floating down stream—the gills appearing to be red and inflamed. Careful examination made it evident that cyanogen compounds in the wash-water were responsible for the poisoning. Cyanogen was discovered to be present in the wash-water to the amount of 32 parts per 1,000,000, expressed in terms of HCN. Mr. W. S. Coulter, who describes the investigation in the "Gas Record" of Chicago, was retained in a consultative capacity, and his tests showed the wash-water to be a very complex liquor, containing a large variety of ammonium compounds with considerable amounts of cyanogen. As a matter of fact, his tests showed 46 parts per 1,000,000 of HCN equivalent; and, in addition, there were about 300 parts per million of suspended solids, consisting chiefly of soot and ash. Considerations of cost made the removal of the cyanogen from the wash-water out of the question; and it was decided to try to eliminate it from the gas itself. The low-grade gas (about 137,000 c.ft. per ton of coal and coke), however, which required scrubbers fourteen times the capacity of those needed for an illuminating gas plant carbonizing the same amount of coal, rendered this a very difficult problem; and finally attention was successfully given to means for keeping the wash-water from the river by utilizing it repeatedly.

SIR JOHN CASS TECHNICAL INSTITUTE.

Mr. Charles Carpenter, D.Sc., presents the Prizes.

LAST Tuesday was prize-giving day at the Sir John Cass Technical Institute, Jewry-street, E.C.; and Mr. Charles Carpenter, D.Sc., presented them, and delivered an address appropriate to the occasion. During the proceedings it was mentioned that at the beginning of the session, the Directors of the South Metropolitan Gas Company decided to give encouragement to their employees to join classes by awarding prizes to those whose work and attendance proved satisfactory.

In the course of his address, Mr. Carpenter drew attention to the advantages of an institution of this character, which permitted of evening study without interfering with the ordinary work of life. By them, after the school training was finished, the opportunity was given to come into contact with humanity at a time, and under circumstances, which would not recur. The development of humanity was the most important thing in education. While the mind was impressionable, they must build-up the character. At the same time, the institution took up the training of the mind or hand in the pursuit chosen. Then came the college course. Giving some practical advice, he urged that students should not overlook the importance of lucid expression. Further, they should not ignore the great value of an elementary training in freehand drawing. Taking things for granted was a great drawback to the extension of one's knowledge of processes and working. The war had opened the eyes of manufacturers in this country to what could be achieved by skilled and scientific management. As to the encouragement to study which his Company gave their employees, it was a purely business proposition. Concluding with some references to the gas industry, Mr. Carpenter said he thought it probable that the manufacturer of gaseous energy was in many respects suffering from a lack of imagination as to the possibilities of the product he made.

During the evening, there was an exhibition of students' work and apparatus.

SULPHURIC ACID AND FERTILIZER TRADES.

THERE has now been published in its complete form, for the first time, the report of the Departmental Committee on the post-war position of the sulphuric acid and fertilizer trades; and it contains figures, &c., which, of course, it was regarded as inadvisable to include in the first edition of the report, which made its appearance during the time when fighting was still proceeding—see "JOURNAL" for March 12, 1918 [p. 489].

It is stated now that the annual production of sulphuric acid in the British Isles before the war was about 1,000,000 tons per annum as 100 p.ct. acid, or equal to 1,500,000 tons of chamber acid. This quantity may also be taken as the national consumption, since both the export and import of sulphuric acid were negligible in amount. The demand for concentrated acid was very small. The large consuming trades throughout the country were users of chamber acid. The estimated annual pre-war consumption for sulphate of ammonia was 420,000 tons of chamber acid. Allowing for a post-war reversion to normal working conditions, the Committee anticipate that the output will be equivalent to 2,572,000 tons of chamber acid, giving a gross surplus of nearly 1,000,000 tons of chamber acid per annum. This estimate was based on the assumption that all plant then under construction would be completed, and that no scrapping of plant would take place. The productive capacity of acid plant either owned or leased by the Ministry of Munitions is estimated at 472,000 tons of chamber acid, or rather less than one-half the gross estimated surplus. Practically the whole of the Government plant is of the contact type. The Government have purchased 100,000 tons of zinc concentrates per annum for ten years from the Australian Government, with the option to take a further 50,000 tons should it be considered desirable. Other ores are expected also to be smelted in large quantities in this country. By converting the sulphurous gases from the roasting of the ores into sulphuric acid, a production of 150,000 to 225,000 tons per annum of chamber acid may be expected.

The report includes a list of the six oleum plants erected at Government factories during the war, and the one at the works of the South Metropolitan Gas Company, as well as the two chamber plants leased by the Government. Several of the Government factories are, the Committee think, poorly situated for the manufacture of sulphuric acid, which is difficult and expensive to carry over long distances. The following addition is now made to the recommendations for providing an outlet for, and generally dealing with, the surplus sulphuric acid which may be expected over pre-war productions: "That the Government should take immediate steps by international commercial treaties or otherwise to secure an effective and permanent control or command of an adequate supply of phosphate rock, and that arrangements should be made in advance for the importation of large quantities of phosphate rock immediately on the termination of the war." The points here noted refer to the only new matter in the report now as compared with the earlier issue.

NATIONAL GAS COUNCIL OF GREAT BRITAIN AND IRELAND.

MEETINGS OF THE OLD AND NEW ORGANIZATIONS.

Last Tuesday, at the Central Hall, Westminster, there were held the Second Annual Meeting of the National Gas Council and the First General Meeting of the reconstituted Council, both of which were well attended. There was also a meeting of the Separate Committee of Employers.

THE OLD COUNCIL.

The Second Annual General Meeting of the Old Council was presided over by Mr. H. E. JONES (the President).

AN ADDRESS BY THE PRESIDENT.

The PRESIDENT, after the minutes of the last meeting had been taken as read, said, in opening the proceedings, unfortunately among the absentees were Sir Hallewell Rogers, M.P., and Alderman Phillips, both of whom were towers of strength to the organization. They had met together that day to "bury Cæsar," in the first instance; but the closing of their career was not quite a death, because it was the birth really of a new association. They only died to bring about a creation of an organization of greater strength and efficiency, based upon a more direct election from the industry, the lack of which was one weakness, as Alderman Phillips had pointed out, of the present constitution. While they heartily welcomed and introduced this newer and stronger body, they had nothing to regret in their own history, but everything to praise, in that happy blending of varied interests, worked out in the initiation of the Council which paved the way for even a better one to follow. Indeed the stresses of the war and the new and abnormal demands on their industry could never have been met so well without the union of their forces which, while it enabled them more promptly to meet national demands, also strengthened them in defending as far as was practically possible their rights and their interests. Critics might carp, and mistakes might be imputed; but, he would ask, "What might have happened to us had we met the stresses of this great war as divided units?" At any rate, now they could base on a very exceptional experience of very critical emergencies—national, financial, and administrative—a scheme for the new Council which, in all human probability, might enable them, in similar stresses, to do better. If their constitution was to some extent casual and provisionally opportunist, for contingencies which were as novel as they were imperative, yet they had dealt (as their Executive Chairman, Mr. Milne Watson, would detail) with all vital questions promptly and effectively; and they claimed to have held their own. Credit for most of the important work of the past two years, under the charter they now concluded, and for the framing of the more soundly constituted and more powerful new scheme, rested with their able and indefatigable Chairman of the Executive Committee, Mr. Milne Watson, to whom, before the proceedings closed, he was sure they would give their very hearty thanks for his strenuous efforts through a period which, for him, must have been, with his large personal interests, of unexampled anxiety, due to war conditions.

In this connection, he might just say a few words now. His own advancing years, and his preponderating passion for taking it easy—which desire came upon a man when he reached his age—made it quite impossible that he could himself be of any further use in the way of the very imperfect and poor service which he had been rendering them as their President; and it occurred to him that there was only one name which could be present to their minds as that of the man they would think of selecting to start the new organization—and this was the indefatigable, the hard-working, and most competent and able Chairman of the Executive Committee. Mr. Milne Watson had lately been placed, by those who knew him best—his colleagues on the Board of the great Gas Light and Coke Company—in the position of their Governor. This had put him in a supreme position in the whole gas world. Whenever interests of any sort were referred to—capital, expenditure, labour, coals, or anything else—the scale of operations of this undertaking gave him an enormous weight to accomplish the very best results. Therefore, if Mr. Milne Watson guarded all these interests, as he would have to do as Governor of the Gas Light and Coke Company, he would almost necessarily have to deal with the matters which they, as representing the new Council, would probably be only too anxious to place upon his shoulders. He would defer any further remarks upon this point until they came to a formal resolution.

He would like to take the last opportunity he would have of addressing them, to refer to what was to some extent in the minds of the whole gas industry—and that was the portentous schemes which were spoken of, possibly assisted by the Government, to develop electricity in a manner which might be injurious to gas interests. He was not going to discuss the matter on scientific grounds, but merely to point out to them what he had satisfied himself was the absolute strength of their own position in opposition to this scheme. The work of the gas industry for the future would be—and, indeed, for the immediate past it had been—more concerned with the heat produced from the gas than with the light. He had seen from a recent return that 99 p.ct. (in many cases 100 p.ct.) of the consumers used gas for heating in larger quantities than for lighting, because the heat from an incandescent burner did not represent a very large consumption of gas. They had already got their communications and distribution system attached to the houses of from 75 to 80 p.ct. of the whole population of their areas, and they were dealing domestically with the question as well as industrially. Of course, they had not all of them, like Sheffield, steel smelting and other large furnaces at their doors; but many of them had smaller industries, in addition to the enormous domestic supply. Before this last winter, they had felt the effect of the restrictions of the Coal Controller, which had reduced their output by from 10 to 12 p.ct.; but now they were again experiencing considerable increases. This all tended to show the trend of events.

Now, why could not the electricians meet them on equal terms of heat? Lord Moulton had mentioned, Prof. Cobb had mentioned, and he himself, in his humble way, had ventured to mention it years ago in his address to the Institution of Gas Engineers. Such was the loss sustained by unlocking the secrets of Nature that before one could get power from fuel through steam, one was faced with such a low efficiency for the fuel that to start to reconvert it into heat was an absolutely ruinous proposition. The gas industry, on the other hand, had an easily distributable fuel at every man's door, available simply by the turning on of a tap. There was needed no fresh apparatus of a costly kind, and of doubtful efficiency. Be comforted, my friends, he went on, you may depend upon it that there is very little for you to fear. Moreover, you may depend upon it that, if the State assists these super-power electric stations, if it provides capital, it will insist on control; and that is not always a thing you need be apprehensive about in competition. We may have a policy to improve our position, and it is one which I have always advocated—that is, to consolidate our interests by a kind of amalgamation or linking-up of the small with the great, the scattered with the present concentrated undertakings. The linking-up of adjoining areas—whether by the supply of gas in bulk or by joint enterprise—would give in many cases enormous facilities to the community, and would give you greater profit. You would also get great profit by this aggregation of your interests, I would suggest, not merely in adjoining areas, but in scattered towns. Mr. Thomas Glover represents a great Company supplying towns situated widely apart; but by this means they have effected many great economies in administration, in the purchase of materials, in controlling the sales of residuals, and in the manufacture of products, which for small undertakings are impossible. Get together and form into associations and each help to contribute the raw material, and let the larger ones manufacture for the smaller ones. Then you will find, as we have found in this Council, that union is strength, union is power, union is prosperity.

Mr. MILNE WATSON, in proposing a hearty vote of thanks to the President for his services to the Council and the industry, and for his address, said Mr. Jones had occupied the position of President ever since the National Gas Council was founded over two years ago; and he could assure them—having worked under him as Chairman of the Executive Committee—that Mr. Jones had been of the very greatest help to the industry. He had spent his life in active work; and at his age—when most men turned towards the easy chair—to take on the responsibilities of the presidency of the National Gas Council was really a most generous action. ["Hear, hear."] It meant constant attention to the affairs of the gas industry, and constant consultations, and weary journeys up to town attending all kinds of meetings in all kind of weathers, which was for him no small thing. Mr. Jones had rendered great service in many ways. His knowledge of gas affairs had been of the greatest benefit to the Executive Committee, as well as his sound judgment, his well-balanced mind, and, above all things, his love of peace. He had been constantly on the side of peace—that was to say, he had been a staunch supporter of the peace party, but not of the pacifist party. It was unnecessary for him to say more. They had all a great personal affection for Mr. Jones; and the work the Council had been engaged in during the last two years had been largely lightened, and had been made really pleasant by his graceful courtesy, great helpfulness, and invariable kindness.

Mr. SAMUEL GLOVER said he had, in the absence of Alderman Phillips, been asked to second this resolution of thanks; and he had great pleasure in performing the duty, which Alderman Phillips would have performed with all his heart, if he had been present. After all that the mover had said with regard to Mr. Jones, he need only reiterate one point from his own personal observation—and that was as to the greatness of the services that their President had rendered in counsel, in consultation, and at their meetings.

The resolution having been carried with applause,

The PRESIDENT expressed his indebtedness to them all for their kind vote. His age, he might tell them, was 76. The arm-chair had great claims upon him, when the snow was on the ground, and when journeys to London were in question; and it would necessarily have increased charms for him as time went on. As

a matter of fact, he had had rather a trying time. When he was their President, he was also put in the chair of the Institution of Civil Engineers, which was in itself no light work; and the double task of serving his own industry in the case of this Council, and serving his older craft (for he was originally a railway engineer), had made it clear to him that, if he wished to enjoy his arm-chair for many years to come, he must go a bit easy. But, speaking of the arm-chair, he also had an affection for another kind of seat, which he had occupied for four hours the previous day—in the saddle of a horse in the hunting field. So he was not altogether decrepit. With regard to his "brain box," if only somebody would fetch it and carry it about for him, it would be in the future as in the past, always at the service of the industry to which he owed so much. He greatly appreciated the compliment paid him in asking him to occupy the chair, and which position he could not have accepted without a great feeling of responsibility; and it was because he felt that this responsibility could be discharged in a more capable and thorough manner than his age permitted of that he came to the conclusion that he could not possibly go on after this time. He would not detain them longer than to say that, in his Presidential Address to the Institution of Civil Engineers, he pointed out that in no way could the distribution of fuel be so efficiently and so economically carried out as it could be by gas companies who had exchanged their old lighting business for fuel. He could only wish them "God-speed" in the new Council; and say that, if Mr. Milne Watson, who had spoken so kindly of what little assistance he had been able to render, should ever want assistance of the same kind again, he would be always welcome to it; for he (the President) would be ungrateful indeed, if he did not recognize the many things that gas had done for him personally.

Half-Yearly Report of the Executive Committee.

There was then submitted a detailed report by the Executive Committee for the six months ended Oct. 31 last. It was pointed out that the termination of hostilities necessarily made a great change in the situation in respect of many matters dealt with in the report, which was presented with this reservation, largely for purposes of record.

Mr. Milne Watson (as Chairman) said the report really spoke for itself. They would notice the great number of subjects that had been dealt with, though he regretted to say that practically none of the questions had been closed. The coal situation still looked most serious. Coke at the present moment was controlled by the Government, and a good many of them thought the sooner the control was taken off the better it would be for them all. The Federation of British Industries had made a start; and they hoped to be useful members, and to derive benefit from its activities. In the matter of financial hardships, they had gained a victory in the House of Commons, considered from the point of view of parliamentary procedure, in getting the House to reverse the finding of the Select Committee—a most unusual proceeding. But financial hardships still remained; and it would be one of the duties of the new Council to take up this question, and press upon the Government and the Board of Trade the fact that it was a matter which must be dealt with, and dealt with quickly. ["Hear, hear."] The industry could not afford to be trifled with on this question any longer. The quality of gas still remained unsettled. Sir George Beilby, however, had a report, he understood in draft, which would no doubt be issued in due course; and this matter, they hoped, would speedily be dealt with in a way satisfactory to the industry. With regard to labour, they all knew about this. It was a question which was certainly far from being settled; and it was probably the most serious one of the future. Fortunately, a very large number of gas undertakings had now come together, and formed an Employers' Committee. He had great hopes that this Committee would find, if not a key to the solution, at least a way of dealing with those labour problems which arose from time to time. The record of the past year spoke for itself. It had, at any rate, been a year of striving, if not perhaps altogether of success. He hoped the next year would be a year of success as well as of striving.

Annual Report and Accounts.

The second annual report, for the year ended Oct. 31 last, was then presented. It was in the following terms:

Second Annual Report.

Income.

The income for the twelve months ended Oct. 31, 1918, amounted to £2011 2s. 9d., subscribed as follows:

Institution of Gas Engineers	£100	0	0
British Commercial Gas Association	1000	0	0
Gas Companies' Protection Association	100	0	0
Society of British Gas Industries	100	0	0
Subscriptions paid by Gas Undertakings	711	2	9*

Expenditure.

The expenditure by the Executive Committee during the twelve months amounted to £1755 15s. 8d., which, with the deficit of £124 14s. carried forward from the previous financial year, makes a total to be met of £1880 9s. 8d. After providing for the transfer of £201 to the Gas Bills (Financial Hardship) Committee, there is a deficit of £70 6s. 11d. to carry forward to the next account.

As was foreshadowed in the first annual report, there has been increased expenditure during the year. This is due to the enlarged scope of the Council's activities.

Policy.

The Council has watched the various developments directly or indirectly affecting the industry.

In order that the Executive Committee might be fully aware of the views of the industry throughout the various sections of the country, it was decided to co-opt representatives of the Scottish Gas Council and the District Institutions or Associations of Gas Engineers and Managers. This course has proved eminently successful.

The Executive Committee found it desirable to retain the services of Mr. Jacques Abady (Counsel) and of Mr. Seager Berry (Solicitor), to assist in the management of the Council's operations.

Activities.

The work undertaken by the Council during the past twelve months has been dealt with in detail in the two half-yearly reports of the Executive Committee. It will therefore suffice here simply to outline the subjects, viz.:

Coal Supplies:

(A) The Coal (Pit's Mouth) Prices Order, 1917.
(B) Price of Coal (Limitation) Act, 1915.
(C) Diversion of household coal to gas-works.
(D) Increases under the Price of Coal (Limitation) Act, 1915.
(E) Shortage of stocks, arrears in delivery, and abnormal percentage of foreign material.
(F) Commandeering of railway wagons owned by gas undertakings.
(G) Coal Mines Regulation Act, 1908
(H) Campaign among miners.
(I) Wholesale Coal Prices Order, 1917. (Factors' Commission.)

Coke:

(A) Contract prices.
(B) Excessive coke stocks.
(C) Fixing of coke prices (Gas Coke Prices Order, 1918).

Electricity:

(A) Preference in granting priority for electrical plant.
(B) Co-operation with electrical undertakings on matters of common interest.
(C) Substitution of electricity for gas by military authorities.
(D) Government pressure on manufacturers to use electricity for power.

Federation of British Industries.

Financial Hardships:

(A) Negotiations with the Board of Trade.
(B) Promotion of Private Bills.
(C) Parliamentary procedure.

Gas:

(A) Gas (Standard of Calorific Power) Act, 1916.
(B) Composition, quality, and pressure of gas.
(C) Gas as fuel for motor vehicles.
(D) Lighting, Heating, and Power Order, 1918.
(E) Household Fuel and Lighting Order, 1918.

Gas-Meter Guarantee.

Labour:

(A) Winter labour and priority.
(B) Schedule of protected occupations.
(C) Employment of women.
(D) Leaving certificates.
(E) Wages—Statutory Rules and Orders, 1917, No. 1061 (12½ p.ct. bonus).
(F) Arbitration *re* wages.
(G) Advisory Wages Committee.
(H) Employment and training of discharged soldiers and sailors.
(I) Dilution of labour in meter-shops.
(J) Ministry of Munitions' recommendation for employment of women in carbonizing departments.
(K) Further application of National Federation of General Workers for increased wages to gas-workers.
(L) Industrial Reconstruction Council.
(M) Trade Boards Bill, 1918.
(N) Joint Industrial Council for the Gas Industry.

Linseed Oil.

Municipal Gas-Works Committee.

Priority for Gas-Works Plant.

Residual Products:

(A) Ammoniacal liquor.
(B) Benzol.
(C) Retort carbon.
(D) Sale of tar to distillers.
(E) Dehydrated tar for road purposes.
(F) Spent oxide.
(G) Sulphuric acid.
(H) Sulphate of ammonia.

Scottish Gas Council.

Utilization of Fuel Resources.

* £201 of this amount is being transferred to the Gas Bills (Financial Hardship) Committee.

Interviews have taken place with Government Departments on the following subjects:

Government Department.	*Nature of Application.*
The Board of Trade	Composition, quality, and pressure of gas.
Do.	Financial hardships.
Do.	Gas Coke Prices Order, 1918.
Do.	Lighting, Heating, and Power Order, 1918.
Do.	Sale of tar to distillers.
Do.	Utilization of fuel resources and co-operation with electrical undertakings.
The Controller of Coal Mines	Gas Coke Prices Order, 1918.
Do.	Lighting, Heating, and Power Order, 1918.
Do.	Household Fuel and Lighting Order, 1918.
Do.	Price of Coal (Limitation) Act, 1915.
The Ministry of Munitions	Campaign among miners with a view to increasing supplies of coal.
Do.	Price of benzol.
Do.	Winter labour and priority for machinery, &c.
The Ministry of National Service	Dilution of labour in meter-shops.
Do.	Winter labour and priority for machinery, &c.
The Ministry of Labour	Claims from the National Federation of General Workers.
Do.	Employment and training of disabled men discharged from H.M.'s Forces.
Do.	Joint Industrial Council for the Industry.
Do.	Wages — Statutory Rules and Orders, 1917, No. 1061.
The Committee on Production	Gas-workers' wages.
The Ministry of Oils and Fats	Linseed oil.

H. E. JONES, *President.*
F. S. PHILLIPS, *Chairman of the General Consultative Committee.*
D. MILNE WATSON, *Chairman of the Executive Committee.*

Alderman KAY (Manchester), in moving the adoption of the report and accounts, pointed out that the latter showed just a small deficit. He acknowledged, like everybody else, that it had been a year of striving; but he looked forward to the future with very great hope.

Mr. GEORGE CLARRY (Cardiff), who seconded, remarked that the accounts implied a certain amount of contradiction. They would see that the wholé business was comprised in a sum of practically £1800; and they would see also that the report dealt with a vast number of subjects. Supposing that the National Gas Council had been a Government Department, what staff and facilities would they have required? In their own case, they had had a monument of industry and energy. Mr. Milne Watson had said he had not achieved success; but then he had laid the foundation, they hoped, for success. It was a legacy that would be handed over to the new Council; and they must not forget, when success did attend their efforts, that it had been rendered possible by the spade-work of the old Council. He would like to say how much they were indebted to the British Commercial Gas Association for their very generous gift. It was a sum of money that had helped to set the Council on their legs.

On the motion of Mr. J. H. ELLIS (Plymouth), seconded by Mr. S. TAGG (Preston), it was resolved: "That in view of the work of the Council being handed over to the re-organized body as provided in the constitution and rules which were approved on Nov. 28, 1918, it is unnecessary to elect or re-elect President and officers of the Council as provided in Rule VI. of the original constitution of the Council; and that a hearty vote of thanks be given to the Council and the officers for their admirable services during a time of exceptional stress."

Mr. MILNE WATSON returned thanks, and paid tribute to the excellent work of the staff. Never, he said, was there a more faithful staff. They had worked extraordinarily hard, early and late, and never uttered a word of complaint. The excellence of their work reflected the highest credit upon the intelligence and the enthusiasm of the staff.

The PRESIDENT endorsed all that had been said about the staff, and thanked those present for their attendance.

This concluded the business of the first meeting.

THE RECONSTITUTED COUNCIL.

Immediately following was the Inaugural Meeting of the Reconstituted Council. Mr. MILNE WATSON having been voted to the chair, the receipt of a number of letters of apology for absence was announced.

The CHAIRMAN said the number of undertakings that had joined the new Council was 425; and these represented no less than 82 p.ct. of the whole make of gas in the United Kingdom. [Applause.] He thought it a very good augury for the future that such a large proportion of the gas made should be represented. The other 18 p.ct. would no doubt find it convenient to join at a later date.

VICE-PRESIDENTS AND DISTRICT EXECUTIVE BOARDS.

It was reported that the following had been selected as the Vice-Presidents of the Council:

Mr. Samuel Glover, representing the Institution of Gas Engineers.
The Right Hon. Lord Moulton, representing the British Commercial Gas Association and the Society of British Gas Industries.
Sir Fortescue Flannery, Bart., representing the Gas Companies' Protection Association.

The number of *ex-officio* members appointed by the associated bodies is 149.

MR. MILNE WATSON AS PRESIDENT.

Mr. H. E. JONES proposed the election—which he was sure would be unanimous—of Mr. Milne Watson as President. Mr. Milne Watson had, he said, been the "Queen Bee" (if he could be of that sex) of the past two years' working. He had kept the hive moving; and the present scheme owed itself chiefly to his efforts. But to say nothing of the work that he had done, his position in the gas world was such as commanded their entire confidence, and ensured, in a manner that no other method could ensure, that they would get his highest and his fullest service in protecting the interests of the whole of the industry, because his own particular company or companies (for he was connected with two or three) represented such a very large percentage of the entire make of gas. It must be evident to them all that they would in future have to keep very much more in touch with the Board of Trade and other Departments than in the past. He had noticed that Mr. Milne Watson possessed the entire confidence of the chief officers of the several Departments with which they had constantly to deal.

Bailie J. C. DRUMMOND (Glasgow) seconded the proposition, which was carried unanimously, with applause.

The CHAIRMAN, in acknowledgment, said he appreciated the honour that had been done him, and must try to live up to all the kind things that had been said. He felt that, in taking up this responsible post, he was supported by the great body of the industry; and, this being so, he hoped to be able to do some work that might be useful to them during the coming year. His view was that these terms of office as President should be only short—not merely so that the honour might go round, but for the sake of getting fresh ideas brought in by new men.

TREASURER AND AUDITORS.

Thereafter, Alderman Kay was elected Hon. Treasurer; and Messrs. E. L. Burton and George Clarry were appointed Hon. Auditors.

The CHAIRMAN said that, as to the Auditors, the old Council had only a small income, while the new Council would have a very substantial one of well over £7000. This involved responsibility which it was not right should be placed upon Hon. Auditors; and therefore the Central Executive Committee would later on appoint a firm of Chartered Accountants to audit the accounts. He would like now to move a vote of thanks to Mr. Charles Clare, who was retiring from the auditorship. It had been a labour of love for him; and they were indebted to him for what he had done during the past two years.

Mr. F. W. GOODENOUGH seconded the vote, which was unanimously passed.

HON. SECRETARIES AND TRUSTEES.

Messrs. W. E. Price and F. W. Goodenough were appointed Hon. Secretaries; and Sir Hallewell Rogers, M.P., of Birmingham, and Mr. H. Wade Deacon, the Chairman of the Liverpool Gas Company, were elected Trustees.

As to the Joint Standing Committees, it was agreed to delegate the appointment of these to the Central Executive Board.

THE LABOUR POSITION.

The CHAIRMAN remarked that this was technically all the business that was before the meeting. He then explained the position with regard to the labour question.

FINANCIAL HARDSHIPS.

The CHAIRMAN went on to say that one of the first duties of the new Council would be to take up the question of "financial hardships." ["Hear, hear."] This was certainly a matter that did not brook delay. It must be dealt with at once, and the just claims of the industry brought before the Board of Trade and the Government. It was quite impossible that the industry should carry on efficiently in the conditions under which it found itself financially at present; and whatever was done for electricity should be done for gas. With this, he had absolutely no doubt that gas could hold its own. In the great heating field, gas was absolutely unrivalled; and it could give a very good account of itself in respect of light and power. Fresh problems were continually arising which they had to face; and he hoped the new Council would be united. There had been many questions in the past in regard to which they had been prejudiced as an industry because they had not spoken with one voice; and he did appeal that day for unity. If there was any question on which they disagreed, let them get together and see

if they could not decide upon a single line of policy, because it was important in dealing with Government Departments that they should understand that the industry was of one mind. If they were not united, how could they expect to be treated as a united industry by the Government? He did hope the reconstituted Gas Council, with no less than 82 p. ct. of the total make of gas, would go forward as one man; and then he would have very little fear indeed for the future of the industry.

YORKSHIRE AND LANCASHIRE DISTRICT.

Alderman ROBINSON (Ossett) referred to the districting scheme, and said that so far as Yorkshire was concerned, the division of Yorkshire and Lancashire was a matter of life and death, as regarded representation on the National Gas Council.

Alderman KAY: That matter is not the business before the meeting, or it would have been raised. There can be no objection to what is suggested happening. The position is difficult. In the Manchester area, we have 312 votes—almost comparable to the Southern District, including London.

The CHAIRMAN: Rule VII., paragraph 2, provides for this being dealt with; and it is on the agenda for this afternoon.* I am absolutely at one with you that we must have Lancashire and Yorkshire divided in some sort of way, and that the London and Southern Counties should probably be divided. We expect some alteration in one or two other districts.

Mr. R. G. CLARRY (Swansea) proposed, and Mr. SAMUEL TAGG (Preston) seconded, a resolution: "That the Central Executive Board consider the advisability of recommending all members to consult with them before taking any action or accepting any legislative, technical, or other procedure on behalf of their undertaking which may create a precedent involving any other undertaking."

Mr. H. C. HEAD (Winchester) proposed, and Mr. ARTHUR VALON (London) seconded, an amendment: "That it is undesirable to consider this matter at this meeting."

The resolution was withdrawn, on the understanding that it would be brought before the Central Executive Board later in the day.

EXPRESSIONS OF APPRECIATION.

Mr. R. G. SHADBOLT (Grantham) said war-time was test-time; and the old Council was born of the war, and had proved its usefulness and weaknesses during the war. It would therefore ill-become them if they were to allow this meeting to disperse without expressing appreciation of the work done in the first phase of the National Gas Council in difficult times and under cramped conditions. He moved: "That the best thanks of this new National Council be accorded to the President, the Chairman, and members of the Executive Committee, and the officials, who have carried us successfully through the first phase of our existence."

Mr. J. FERGUSON BELL (Derby) seconded the resolution, which was carried with loud applause.

Mr. H. E. JONES, in acknowledging the vote, said the Council had had to find the methods of meeting, in hot haste, without delay, the most extraordinary emergencies.

This closed the meeting.

SEPARATE COMMITTEE OF GAS EMPLOYERS.

At the subsequent Inaugural Meeting of the Separate Committee of Gas Employers, Mr. MILNE WATSON was again voted to the chair.

The CHAIRMAN, in opening the proceedings, announced that the number of undertakings that had joined the Committee was 246, out of the 425 belonging to the Council. Though it was not such a large representation, still it was 61 p.ct. of the gas sold in the United Kingdom.

APPOINTMENT OF OFFICERS.

On the appointment of a Chairman for the Committee coming up for consideration, the feeling was expressed that the President of the National Gas Council and the Chairman of the Employers' Committee should be one and the same; and after some discussion, Mr. Milne Watson was appointed Chairman, and Mr. Thomas Hardie (Newcastle) and Alderman Albert Ball (Nottingham) Vice-Chairmen of the Committee—in this way securing representation of both companies and municipalities.

It was agreed that the Secretary should be the same as the Secretary of the National Gas Council.

DISTRICTING ARRANGEMENTS.

Mr. F. A. PYE (Chester) then raised the question of the districting arrangements, and asked that the position of North Wales should be considered again by the Executive with a view to seeing which was the best district to put them into.

Mr. J. PATERSON (Cheltenham) also urged that it was desirable to effect some re-distribution in the Midland district. He said that his Directors, who had hitherto adhered to the Committee, were considerably concerned about the matter.

Mr. WILLIAM CASH (London) said there was another side to the matter; and in some respects the smaller towns would gain by being joined with the large ones.

Mr. HUBERT POOLEY (Leicester) said the districting had been carried out practically in accordance with the representation of the various Gas Associations, without any regard to counties or county requirements. It would be very much more rational to consider the matter county by county.

The CHAIRMAN promised that the matter should be taken into consideration by the Executive Board when it met; and it was referred to them on the proposition of Mr. PATERSON.

* At the meeting of the Central Executive Board in the afternoon, the division of Yorkshire and Lancashire was agreed to in principle.

A LUNCHEON AND SOME SPEECHES.

Following the meetings reported above, the President of the now defunct National Gas Council (Mr. H. E. Jones) entertained at luncheon some of his old associates of the Executive Committee, together with a few friends. The enjoyable function was not by any means to celebrate the demise of the old Council, but was more in the nature of a link between the outgoing and the incoming bodies, and a place from which, among friends, the late President could wish "God-speed" to the new body.

Our host was in the chair; and on his right-hand side was Mr. D. Milne Watson. Prominent members of the new Council were also there; and among others was Mr. R. J. Neville Neville, the Chairman of the Brentford Gas Company, and Sir Arthur Duckham, K.C.B. From the chair, the toast of "The King" was submitted, and then

Mr. JONES said the incoming of a newer, stronger, and, it was hoped, more effective Council for the gas industry was a suitable opportunity for wishing it the utmost success. It had been nicely said that morning by Mr. Shadbolt, supported by Mr. Ferguson Bell, that the history of the old Council deserved some recognition. He had already said that the old Council had nothing for which to apologize, nothing for which to atone. Criticism might be levelled against it; but it must be borne in mind that the Council was brought into existence under great pressure and very suddenly, in order to meet a number of emergencies such as had never before arisen in the gas industry. He thought he had a right to say this; for not only had he been for fifty, or rather nearly sixty, years, man and boy, in the industry, but he had not long since to look into the history of gas in connection with a lecture before the Institution of Mechanical Engineers, in which he sketched the life and progress of gas engineers of the last century; and he had therefore to go back to the original base rock. From his knowledge and his investigations, he could say that he had never known coals to increase in price to anything like the figures to which they had risen during the war. There was a coal famine in 1878; and the price then jumped to high figures. But at that time there was no maintenance of the rate that had prevailed during the stress of this war. Nor had they ever had labour costing so much. The gas industry had the shorter hour movement years ago. With it the eight-hour shift came as a matter of course; for in their continuous operations the day must be divided by three. However, that was met at a cost of 1d. or 2d. per 1000 c.ft. of gas; and many engineers present could sympathize with him, and he with them, in the task they had had to find out how they could, by mechanical devices, rearrangement of carbonization plant, and transport, save 1d. or 2d. per 1000 c.ft. But how futile all this seemed to be, when the coalminers could so easily make them pay extra for coal the equivalent of 1s. per 1000 c.ft. The small economies produced by mechanical appliances fell into the shade before what they had now to meet from labour, coals, and other materials, which were very difficult to get. This might rectify itself, but not for a long time to come, and he again spoke of the work of the past two years, and of Mr. Milne Wilson's devotion through all the emergencies, difficulties, and problems that had come upon them. The industry, it was obvious, was still in for very trying times and pressing emergencies; and there were many problems which it would be their duty to solve. Those times and those emergencies could not be met by disunited action. Under these circumstances, with all heartiness and goodwill, he gave them the health of the new body. Long might it prosper and succeed in doing good work. They were in for troublous times and deep waters; and with his hearty congratulations upon what had been accomplished in reconstituting the Council he would say: "Go forward, harden your hearts, and steel your breasts to contend with the problems with which you have to deal."

Mr. D. MILNE WATSON said they all appreciated very much the congratulations and good wishes of their old President. The late National Council, as he had said, was born of necessity to meet problems which it was quite impossible for the industry to deal with in the manner in which it was organized. The old Council, he thought they all recognized, was imperfect; but it had been able, under the leadership of Mr. Jones, to achieve a considerable amount of success. There was a substantial difference between the new Council and the old. The new Council was going to be really and truly representative of gas undertakings. Through it there was not a single undertaking which could not claim to have a voice in the industry. If they did not join, it was their own fault, be they company or municipal undertakings. They were all entitled to come in, and to give the industry the benefit of their views. If they made out a good case, it would be taken up and dealt with by the Council. The new Council was an enormous step in advance of anything that had hitherto obtained in the way of organization in the industry. He did not believe all wisdom resided in any particular man, or in any particular group of men. They wanted the whole of the brains of the industry. They wanted all the peculiarities of the industry, all its local conditions, to be represented in the National Gas Council. This was the difference between the old and the new Council. It would give the industry a voice and position it never had before. It was going to speak with an absolutely united voice on all questions concerning the industry. Previously there was a considerable body of opinion which was not expressed. This was now done away with. What they were going to do could not yet be said; but they were going to put up the very best fight they could for the industry. It was necessary that this should be borne in mind. They were not always governed by the big areas or by the big companies or undertakings. Very often important matters had been begun at the small end of the stick. Company

or local authority undertakings of the smaller order had been pressed, and had given way; and then what had happened in their case had followed right through the industry. They had now a body which would deal with the whole of the questions nationally. They had 82 p.ct. of the gas output represented in the National Council; and he hoped that before the Council as a body met again, they would have in it the whole 100 p.ct.

Sir ARTHUR DUCKHAM proposed the health of their friend and host, Mr. H. E. Jones. When he (Sir Arthur) first joined the gas industry, there were four men whose names he got to know very quickly; and those four men he got to know well later on. They were his old chief, Sir George Livesey, Sir Corbet Woodall, Mr. Harry Jones, and Mr. Thomas Newbigging. Those names would live, and continue to live, in the gas industry. There was no need for him to say anything about the past work of Mr. Jones. But he had done a specially good work in helping to lay the foundations of this great National Gas Council, which they all trusted would go on and prosper, and do what was needed; and, after all, it was in their own hands what was done, and not in those of other people. If they pushed on their job, it would be well done. From Mr. Jones, he had learnt much. The work he had done—commercially and technically, and in all ways—had been well done. He was a man of deeds, but still a boy at heart. His frankness of speech, and the perfectly straightforward manner in which he approached and studied all questions, were things that endeared him to them all.

The toast was heartily honoured.

Mr. JONES, in his acknowledgment, said that, when occupying the Presidential Chair of the Institution of Civil Engineers, he did not hesitate to say he was proud of being a gas engineer, and he was proud of the work he had done through his professional life. He tried to inoculate the minds of the members of that Institution with the fact that, though not engaged on the building of railways, it was good to be an engineer in some other branch. The honour they did him two years ago in placing him at the head of the National Gas Council came late in life, but not too late to awaken certain pleasures in him. It was a matter of great pride to him to be living at the end with the knowledge that he possessed the regard of his fellow gas engineers. He was proud of the progress of gas. He wanted, however, to warn them against allowing their minds to get pessimized regarding the future of gas. The Company of which one of his sons was Engineer had just reduced its price by 6d. He was proud of this, because he had satisfied himself that it had within it the element of elasticity. His own father, himself, and now his son—three generations—had occupied the position of Engineer to that Company. It contained the elements of strength—low capital expenditure and other things—which had been the work of his life. Therefore he was a proud old man. He was proud of the industry, proud of his work, and proud of those who now represented him in working for gas. Whatever little he could still do would be at the service of the industry unreservedly, and with all the zeal he was able to bestow upon it. He thanked them heartily for the terms in which this toast had been put, and for the manner in which they had been endorsed.

There was applause; and those present soon afterwards left the tables—thus ending the first acts in the establishing of the new Council.

FIRST MEETING OF THE CENTRAL EXECUTIVE BOARD.

The First Meeting of the Central Executive Board of the Reconstituted National Gas Council was held at the Central Hall, Westminster, on Tuesday afternoon last.

It was proposed and seconded that Mr. D. Milne Watson be Chairman of the meeting. This was carried; and, later, Mr. Milne Watson was unanimously elected Chairman of the Board. Alderman F. S. Phillips was unanimously elected Vice-Chairman; and, it having been reported that his absence from the meeting was due to indisposition, it was resolved to send him a message expressing the Board's hope that he would soon be fully restored to health.

A small Sub-Committee was appointed to consider the following matters and report thereon to the Board:

Appointments of a Manager, Secretary, and clerical staff.
Employment of a firm of professional Auditors.
Appointment of a Finance Committee, and determination of procedure to be adopted as to the signing of cheques.

Mr. W. J. Smith was authorized to be "Acting Secretary" until further notice.

The Chairman reported the steps taken for selection of suitable offices for the Council; and this matter was also referred to the Committee, with executive power.

It was decided that the application of the Manchester District Executive Board for the division of their area into two portions be agreed to—viz.: (1) Lancashire; (2) that portion of Yorkshire formerly comprised in the "Manchester District;" each of these districts to appoint four members to sit at the Central Executive Board.

Applications for division received from other districts were referred back to the districts for consultation among their members, with a request that they should report upon suitable delineation of areas—it being understood that subdivision would not necessarily carry the right for each subdivision to elect four members to the Central Executive Board.

The following District Representatives were appointed to serve on the Executive Committee of the National Benzol Association:

Mr. Alex. Wilson, Glasgow.
Mr. J. H. Canning, Newport (Mon.).
Mr. J. H. Ellis, Plymouth.
Mr. C. S. Shapley, Leeds.

It was decided to supply the Secretaries of the District Executive Boards with uniform minute books and letter headings; and that each District Board should be asked to keep for the next three months a strict account of expenses incurred (including travelling expenses of members of the Central Executive Board for the districts), at the expiration of which period the matter will again be considered by the Central Board.

ELECTRICITY SUPPLY MEMORANDA.

CONSIDERABLE satisfaction ought to be felt by Prof. Cobb. His recent article in the "Edinburgh Review" ["JOURNAL," Jan. 28, pp. 158, 162] contained some heavy blows against the report of the Power Sub-Committee of the Coal Conservation Committee; and it also showed that gas manufacture and utilization possess an efficiency before the glory of which not even the best that can be hoped for from the super-stations can hold up its head. This may sound like boastfulness, but, of course, it is not. It is only the plain truth of the position. The reason Prof. Cobb should feel satisfaction is that our friends of the electrical journals have been reading the article; and they fail to find weak places in it for destructive criticsim. A few vapid remarks are made, and a little nonsense indulged in; but the figures and facts stand perfectly stable. "Electrical Industries" finds the report long and interesting. We can quite understand this, because the electrical writer would fain believe that there is no connection between gas-fires and fuel conservation. He refers to it as "the *alleged* connection." He can get no farther. He will not say positively there is no such connection, nor that there is. He will not, because he cannot, throw down upon the table the proof that no connection exists; and to attempt to destroy the figures presented by Prof. Cobb would only lead to disaster. So perforce the writer has to be content with referring to the matter as though the connection was nothing more than a beautiful fancy on the part of gas people, and not a material fact. This statement by our contemporary ends a paragraph which precedes the paraphase of some of the statements in Prof. Cobb's article. We feel almost sorry for the electrical people; for, after being mightily loud in their vaunting, they have been driven back among the minutiæ of domestic convenience which can be served electrically, at the same time hanging on to the electric-oven door, and pushing forward as much as they can the claim as to the electric-heater being serviceable for occasional use. All these things combine to make an extravagant tax on the coal reserves of the country, when it is found that of the heat energy of the coal, only some 5 to 10 p.ct. (allowing the appliances 100 p.ct. efficiency!) is realized by the consumer.

Awkward Truths.

The electricity supply industry devoutly wishes that revolutionaries, social reformers, prophets, and other undesirables would leave its affairs alone, and not present the public with promises which can never be honoured. The public are being misled through the interference of these busybodies, who have, as a rule, the vaguest knowledge on the subjects over which they exercise their pens. A short article—drivel undiluted—appeared recently in the "Daily Mirror" by (so the heading suggests) "A Mining Engineer." His opinion is that the electrification of the coal supply would be the panacea for all our industrial and domestic woes. He would have the coal converted into electricity at the pit's mouth; and the energy be wired to every home and factory in the country. "A Mining Engineer" does not, and cannot, guarantee the capital and working costs. He knows nothing about what the costs of distribution would be. He does not indicate where at the pit heads the enormous volumes of water are to be obtained that would be needed by electricity generation on the large scale. If he could tell the electrical industry these things, he would confer a benefit on a profession to which he does not belong, nor for which he has the necessary qualification, except to lead it, if his counsel were accepted, into endless difficulty and financial ruin. Convert all our domestic heating to the electrical method, and what would it mean? That the plant required for the generation of the electrical heat energy needed in winter would be standing idle during a large part of the year, when rooms require cooling rather than heating. He tells his innocent readers too, that 60,000,000 tons of coal would, under his scheme, do the work of 150,000,000 tons of coal as now used. This is ignorance and folly of the first order. If in industry and in domestic service, 20 p. ct. thermal efficiency from the coal used direct can to-day be obtained, and the highest efficiency that the Power Sub-Committee of the Coal Conservation Committee can hope for in electrical generation is 13 p.ct. (without reckoning transmission losses, and the difference between 100 p.ct., and the actual efficiency of electricity using appliances), while the actual average efficiency of electrical generation to-day is only between 5 and 6 p.ct., then, instead of a saving in coal, the 150 million tons referred to would have to be considerably enlarged instead of reduced to 60 million tons. The dream of a general supply of electricity at ½d. per unit for power purposes (which the public think includes heating purposes) is still a dream. Would that our newspapers had the qualification

Nescient Advisers.

in their editorial offices to keep them from publishing such blundering statements as these, which are the products of sheer ignorance.

The National Kitchen Movement.

It is announced that Alderman C. F. Spencer has retired from office as organizer of the National Kitchen movement for the Food Control Department. He has worked hard, and has made friends in some quarters, but (we are afraid) enemies of the recognized caterers. What impression the National Kitchen movement has had upon the food position in the country, it is difficult to estimate; but placing their output against the total food consumption of the country, it must be as a molehill when compared with a mountain of the first order. We rather think by the signs which are cropping-up here and there that as the food situation eases, these National Kitchens will become nothing more than a memory. Certain it is food caterers—considerable ratepayers—are making a dead-set against this form of favoured competition; and their view that it is unfair to private enterprise is being widely endorsed by other traders. If National Kitchens, why not national butchers, bakers, greengrocers, and so on? There would have been a great deal more sense in the ensuring of cheaper food than in the National Kitchen movement. The former during the reign of food shortage would have been a more practical aid to the community than the National Kitchen, which could serve but relatively few. Some practical lessons have been learnt from the kitchens. There was a time when a very strong effort was made to pack them with electrical appliances. It was found that the all-electric National Kitchen was a costly and impracticable thing; and that in the cause of economy gas and coke were serviceable fuels. A good many of the kitchens were fortunate in not being saddled with electrical appliances. Another experience was that not all districts selected were favourable to the success of National Kitchens. There have been not a few financial failures. The latest are the kitchens at Greenwich, where one would have thought that the population was exactly of the kind that would, if anywhere, have made the kitchens a success. But the reverse is the fact. A loss of £7 to £8 a week is reported; and the Food Control Committee have recommended that the kitchens be closed. In the City we have a different condition of things. It is the workers by day who are away from their homes who have made a success of the much-lauded Bridge Street example. Novelty has had much to do with making a success of some kitchens in the more suitable neighbourhoods; but dwindling queues and patronage show that something more than novelty is necessary for keeping them alive, and in a condition of healthy prosperity. A very small percentage of any population has been served by them. Even in the times of dear food, home cooking has maintained its attractions. What is wanted is cheaper food and free shopping; and National Kitchens in residential neighbourhoods will then soon find themselves quite deserted. It has been an attempt at meeting a problem by attacking it at the wrong end.

Germany on the British Track.

Anyone might think that the Board of Trade Electric Power Committee had been assisting Germany to come to a decision as to how best to treat the electricity supply of the country; for the Imperial Board of Economics have arrived at much the same conclusions as to the process of reformation as the Board of Trade Committee in this country. But the Imperial Board of Economics have been considering all forms of energy; while here we are only concerned with the report of the representative entrusted with electricity supply. He does not, like the investigating bodies at home, approve of the stations having been dotted all over the country, without any apparent system, of private monopolies having been set up, and of power stations having been established by very small communities. There are 4000 power stations. This knocks the provision in this country into a cocked hat. About 100 power stations, it is considered, would be sufficient for all requirements. As in this country, too, the investigator proposes that all stations that are producing economically should be allowed to survive, and that the others should be scrapped. Further the suggestion is made that the country should be divided into districts, and the power stations that passed muster in these districts should be combined, and thus all competition between them should be stopped. In this way, it is expected to attain the highest degree of economy in both the production and utilization of the current over wide areas, and thus prevent the great waste resulting from the existing lack of system in the planning, establishment, and working of power stations. This all very much reflects what has happened in this country. But the report does not propose that electricity shall be the favoured darling of the State. The Board of Economics suggest that the State should reserve to itself the right to establish departments or authorities to control all kinds of fuel, water power, and other sources of energy—the combined groups having the privilege of self-administration in respect of the supplies of energy. The Empire and the Federal States would be represented on the boards or departments, while the self-administering organizations would be composed exclusively of producers, consumers, and interested technical workers. As regards labour control, the proposal is that employers and workmen should be equally represented. The Board of Economics would exercise supervision, and would be assisted by a body of expert advisers. Exactly what this all means, we will leave our readers to determine. But it looks very much as though the proposal is to put a good deal of harness on the industries supplying energy—the idea being to assist the economic development of the country. But too much harnessing might defeat the object.

LOW-TEMPERATURE CARBONIZATION IN RELATION TO THE PRODUCTION OF MOTOR SPIRIT, FUEL OILS, SMOKELESS FUEL, AND POWER GAS: ITS AIMS AND OBJECTIVES.

By F. D. MARSHALL.

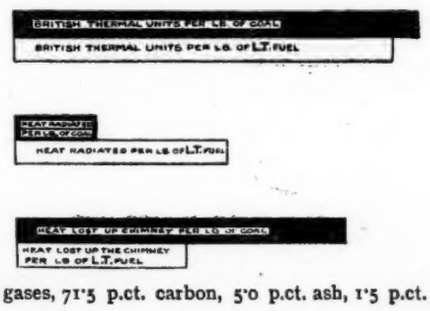
INTRODUCTORY.

EVEN the man in the street must have grasped by this time that our national asset, coal, is being wasted at an appalling rate; and men of science who have made a study of this particular subject see in this waste a danger which will eventually threaten our economic existence, because the chief wealth of Great Britain lies in her coal resources.

Though much has been written and spoken, and committees have been formed *ad nauseam* to deal with the question, matters remain precisely where they were. Coal is consumed practically under four heads: (1) Domestic; (2) industrial; (3) gas-works; (4) coke-ovens. It is being wasted hopelessly under heading No. 1, and to a great extent used inefficiently under the remaining three heads, because of the neglect to recover the maximum value in bye-products.

DOMESTIC COAL.

Dealing with No. 1. When the householder purchases a ton of good coal, he receives for his money approximately: 20·0 p.ct.


BRITISH THERMAL UNITS PER LB. OF COAL
BRITISH THERMAL UNITS PER LB. OF L.T. FUEL
HEAT RADIATED PER LB. OF L.T. FUEL
HEAT LOST UP CHIMNEY PER LB. OF COAL
HEAT LOST UP THE CHIMNEY PER LB. OF L.T. FUEL

volatile gases, 71·5 p.ct. carbon, 5·0 p.ct. ash, 1·5 p.ct. nitrogen, and 2·0 p.ct. water. But what does he realize from this when consuming the coal in an open grate? Practically the whole of the volatile gases pass up the chimney in the form of flame and smoke; the former to expend itself in warming the chimney, and the latter to be condensed by the atmosphere into a sticky soot, providing a living for the sweep, but making London and our great cities in winter time deplorably dirty and unwholesome. Of the carbon, 80 p.ct. or so is unavailable for room heating purposes, because a great portion of the heat of combustion is employed in decomposing and volatilizing the coal.

WHAT THIS LOSS REPRESENTS FROM THE STANDPOINT OF THE CONSUMPTION OF RAW COAL FOR DOMESTIC PURPOSES.

The Coal Commissioners' Report of 1903, from which date statistics appear difficult to obtain, gives the following most interesting table of the coal consumed in the British Isles under various headings. The figures would have naturally altered in 1918; but the following are sufficiently suggestive for the writer's purpose.

Railways	13,000,000 tons.
Coasting steamers and bunkers	2,000,000 ,,
Factories	53,000,000 ,,
Mines	18,000,000 ,,
Iron and steel industries	28,000,000 ,,
Other metals and minerals	1,000,000 ,,
Brickworks, potteries, &c.	5,000,000 ,,
Gas-works	15,000,000 ,,
Domestic	32,000,000 ,,
	167,000,000 ,,

In 1912, the total output of coal was 260,400,000 tons, and in 1917 248,500,000 tons. The difference between these figures and the 167,000,000 tons given above probably represents coal exported. If, therefore, we take a round figure of 30,000,000 tons as consumed for domestic purposes, it represents the passing away

through the chimney, in the form of burnt gases, producing smoke and soot and other deleterious matters, approximately:

Motor spirits	90,000,000 gallons.
Illuminating and fuel oils	150,000,000 ,,
Heavy lubricating oils	210,000,000 ,,
Pitch	800,000 tons.
Sulphate of ammonia	1,200,000 ,,

[Nitrogen in the form of sulphate of ammonia equivalent to 90 lbs. of sulphate per ton of coal based on a content of 1½ p.ct. of nitrogen.]

The gross value of these dissipated products is approximately £57,000,000, of which the loss of ammonia alone reaches the sum of £15 per ton (gross), or £18,000,000!

The Industrial Standpoint.

We will now consider the losses from the industrial standpoint on the basis of an all-round consumption of 70,000,000 tons annually; and whether the raw fuel is consumed in the domestic grate or under boilers, &c., the bye-products are dissipated. Although, be it remarked that the consumption of solid fuel in the scientifically constructed modern boiler is infinitely more economical than by consuming fuel in the modern domestic grate, which has not greatly advanced beyond the principle of the grates used in the Stone Age! Using the same fundamentals as in the case of the 30,000,000 tons of coal consumed in the domestic grates, and applying them to the 70,000,000 tons consumed for industrial purposes, we reach the following results. In this case, however, gross commercial values have been placed on the products, which are based principally on pre-war figures, but which, in the writer's opinion, will never (at least for many years) revert to these low figures again. This, however, is speculation. But the figures are interesting nevertheless.

The 70,000,000 tons of raw coal would produce approximately:

Motor spirits	210,000,000 gallons
Illuminating and fuel oils	350,000,000 ,,
Lubricating oils, &c.	490,000,000 ,,
Pitch	1,700,000 tons
Sulphate of ammonia	2,810,000 ,,

[Nitrogen in the form of sulphate of ammonia equivalent to 90 lbs. of sulphate per ton of coal based on a content of 1½ p.ct. of nitrogen.]

The gross value of the above would amount to about £77,000,000. So that if we consider the two sources of waste together, it approaches the enormous total of £133,000,000 annually. Supposing, however, the raw coal, before reaching the consumer's fire-place or the boiler furnaces, be treated by a process whereby the valuable bye-products were extracted in the form of petrol, oils, paraffin wax, pitch, &c., and the carbonaceous residue in the form of a smokeless, easily ignitable fuel, burning with a minimum of draught, could be assured to the domestic and industrial consumer. Surely such a proposition would be one of paramount national importance, as a big stride towards mitigating the ever-increasing smoke nuisance and waste? The process by which the results indicated are obtainable is by submitting the raw coal to what is known as "low-temperature carbonization," which will be explained in detail later.

After the liquid bye-products, together with a portion of the nitrogen in the form of ammonia, have been eliminated by the low-temperature carbonization operation, there remains a solid residue of a remarkable form of coke equivalent to 70 to 75 p.ct. of the original coal, which contains the bulk of the nitrogen that was present in the original coal. The coke is an ideal domestic and industrial fuel; but it is clear that if it be consumed as such, then the bulk of the recoverable ammonia will be irretrievably lost. This, however, need not be the case if the coke were adopted as fuel for boilers and other industrial purposes. The coke can be consumed under boilers with advantages in its solid state without any further treatment, and has proved an excellent fuel; but this only half-way towards realizing the full value of the coal.

Therefore, for industrial purposes, we advance a step further, and submit this low-temperature coke to a secondary and well-known process of gasification in what are termed ammonia recovery gas-producers. By this operation not only is the nitrogen contained in the coke recovered in the form of ammonia as far as practically possible; but the coke produces, on being submitted to gasification, a very large volume of producer gas. Each ton of coke fuel will yield from 120,000 to 140,000 c.ft. of gas, having a calorific value of 120 to 130 B.Th.U. per cubic foot, which gas, in its turn, can be employed simply and economically for industrial purposes—boiler firing, gas-engines, heating furnaces, &c.

Let us consider for a moment (returning to previous figures) what the difference is from the ammonia standpoint in consuming the coke in either a solid or gaseous form, taking 70,000,000 tons annually as a basis. By the preliminary low-temperature carbonizing process, 570,000 tons of sulphate of ammonia, worth (gross) £8,550,000, is obtained; but by converting, by the secondary operation, the coke into power gas, and recovering the bulk of the nitrogen as ammonia, we should produce 2,810,000 tons of sulphate, having a gross value of £42,150,000, and at the same time, from the 49,000,000 tons of coke (70 p.ct. by weight of the original coal), we produce 120,000 to 140,000 c.ft. per ton of producer gas of 120 to 130 B.Th.U., which can be profitably sold at from ½d. to 1d. per 1000 c.ft.

If the nitrogen contained in the low-temperature coke, or for that matter high-temperature coke, is to be recovered, it is evident that it can only be effected by treating it in the gas-producers. This is something for my colleagues, the gas companies' experts, to ponder over. As a result of their operation, they produce about 66 p.ct. of coke from a consumption of approximately 15,000,000 tons of coal annually, which equals nearly 10,000,000 tons of coke. Part of this is used as fuel for the retort-benches, part is sold to British consumers, and a considerable portion to foreigners. But whatever happens, taking previous figures as a basis, and assuming they recover ammonia equal to 25 lbs. of sulphate per ton of coal by their carbonizing operations, this leaves, out of a possible 90 lbs., 65 lbs. to be accounted for. This 65 lbs. of sulphate of ammonia in 10,000,000 tons of coke equals 430,000 tons, which at £15 per ton (gross) represents the respectable figure of loss of £6,450,000 annually.

Boiler Firing.

This gaseous fuel would be burnt under large batteries of boilers for steam-raising purposes; small installations would use the coke residue in the same way as they at present use coal. The advantages would be as follows:

(1) The boiler efficiency would be increased owing to the clean condition in which the heating surfaces can be kept, and the maintenance of complete combustion.

(2) Constant and equal distribution of heat could be maintained, as there are no fire doors to be opened; thus avoiding the bad effects of periodically admitting cold air.

(3) The cost of attendance will be greatly reduced, as one man can attend to a whole range of boilers.

(4) Firebars and mechanical stokers, with their attendant wear and tear, are avoided.

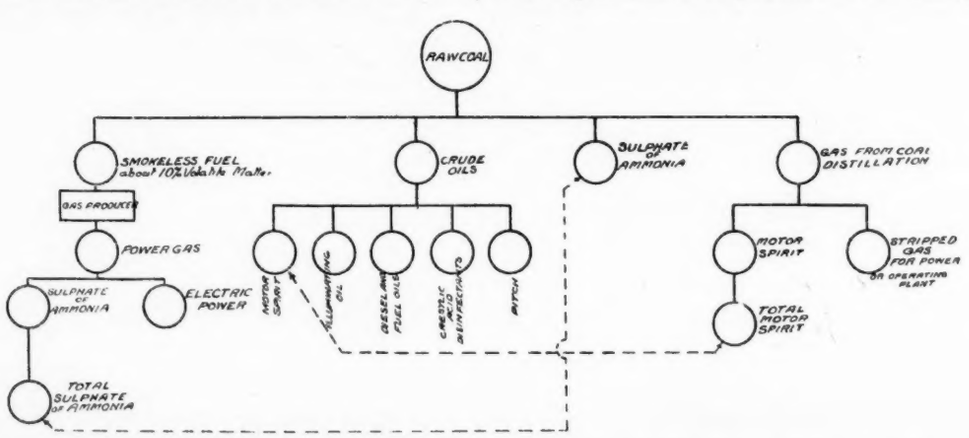
(5) There are no ashes or clinker to remove. Consequently the use of ash hoists, conveyers, and so forth can be dispensed with.

(6) No costly coal elevators, cranes, and bunkers to provide.

(7) If gaseous fuel can be provided at ½d. to 1d. per 1000 c.ft., and the boiler is slightly modified to meet the new conditions, no doubt gaseous firing will eventually supersede coal firing.

Production of Electricity.

By the introduction of some cheap gaseous fuel, whether it is used for steam raising or consumed direct in efficient gas-engines, it is calculated that the cost of a kilowatt-hour at the switchboard would not exceed ⅛ to ¼ of a penny. The figures were given to the writer by one of the large electrical companies that 110 c.ft. of 130 B.Th.U. power gas will develop in good engines one kilowatt hour, and, if for raising steam 200 c.ft. will likewise develop one kilowatt hour, if efficient steam turbines are employed. It will thus be seen that it would be possible to produce electric power at a cost which would compare favourably with waterfall power, and render possible in our own country the econo-



FLOW SHEET SHOWING THE PRODUCTS OBTAINABLE BY THE LOW-TEMPERATURE SYSTEM OF CARBONIZATION AND THE GASIFICATION OF SMOKELESS FUEL.

mical production of carbide of calcium, which, so far, is almost exclusively a foreign industry; and with a cheap electric power many things are possible. It is clear that such a scheme as outlined must appeal vividly to electrical undertakings of magnitude in the United Kingdom.

CYCLE OF OPERATIONS.

The accompanying diagram clearly explains the cycle of operations, which may be epitomized as follows:

(1) Carbonization of the raw coal at a low temperature and recovery of the liquid products and a portion of the ammonia.

(2) Gasification of the resultant coke into producer gas, with the recovery of the bulk of ammonia.

(3) Conversion of the power gas into electricity.

This cycle of operations recovers every valuable constituent composing the raw coal, and only leaves an ash residue; and even this, by reason of the fact that it contains very little or no carbonaceous matter, is valuable for brick making, concrete, and other building and constructional purposes.

(To be continued.)

THE DAVIS "REVERGEN" PRINCIPLE OF FIRING FURNACES WITH TOWN'S GAS.

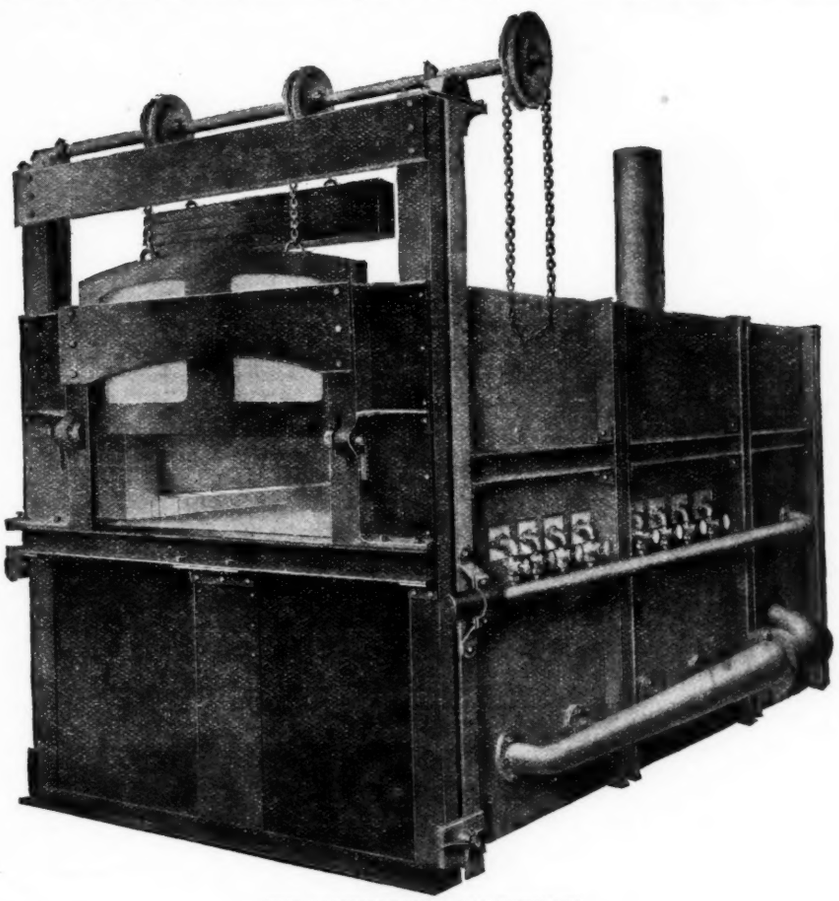
A New Recuperative System, for which Great Efficiencies are Claimed.

A THREE DAYS' demonstration of a patent oven furnace constructed on what has been named the Davis "Revergen" principle, was held at the Davis Furnace Company's works, at Luton, during last week, and was well attended by representatives of the Technical and Engineering Press, who were specially invited to investigate—under actual working conditions—the exceptional claims advanced by the patentees in respect of the new system. We give below a comprehensive description of the "Revergen" principle, together with some particulars of actual tests of oven-furnaces constructed in conformity with it.

Despite the rapid development of the gas-fired furnace which has admittedly taken place during the past few years—mainly as a result of intensive war-time production—it is clear that much has remained to be done to achieve maximum efficiency in respect of this class of gas-consuming apparatus. Recognition of this fact is ungrudgingly conceded in a pamphlet before us describing the Davis Furnace Company's new invention relating to the firing of town's gas furnaces, for which system the name "Revergen" has been registered as the trade mark.

It is pointed out that physical examination of the flue gases of any existing type of town's gas furnace in operation is sufficient to demonstrate both the marked need for, and the great possibilities of, effecting thermal economies, by the more thorough application of science to the problem of furnace recuperation. In an oven-furnace of the usual type, working at a temperature of (say) 1000° C., a flue gas temperature of as high as 900° C. may often be experienced, in which case no less than 40 p.ct. of the heat from the gas consumed is lost by way of the flue. If, therefore, the flue temperature of such a furnace can be reduced by efficient recuperation to 50° C., the heat loss will be approximately 2 p.ct. only, and a saving of 38 p.ct. effected by this means alone, to say nothing of the increased efficiency, resulting from the higher flame temperature known to be promoted by the thorough preheating of the secondary air.

It is the scientific study of the theory thus stated—a theory the soundness of which cannot be gainsaid—that has led to the result represented by the system now under review; for, to quote the inventors, the "Revergen" principle may be most simply described as a "system of town's gas furnace firing by means of which heat losses by way of the furnace flue (excessive in practically every method of town's gas furnace firing hitherto employed) are reduced to an insignificant minimum, and the thermal energy thus recovered utilized almost exclusively for the practical purpose of the furnace."



THE "REVERGEN" GAS-FURNACE.

It will be obvious that, other things being equal, the efficiency of any two furnaces will vary inversely as the temperature of the escaping gases, and that the reduction of the latter by the utilization of the available heat units for the actual furnace operation, represents a substantial saving in fuel consumption.

OVEN AND FLUE GAS TEMPERATURES OF A "REVERGEN" FURNACE AT DIFFERENT GAS RATES.

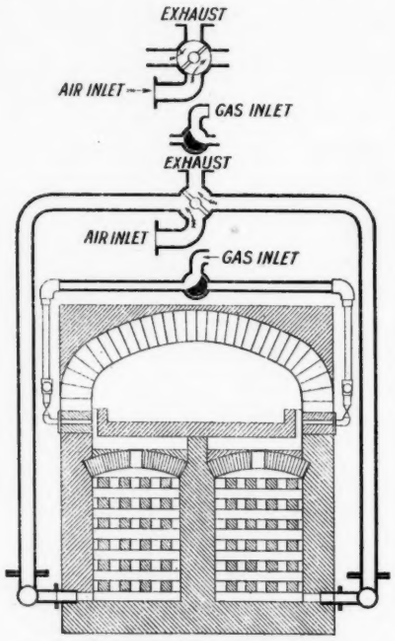
The following figures show the oven temperature at progressive

gas rates, and the extraordinary low flue gas temperatures at four working temperatures, actually recorded in the case of a furnace constructed on the new Davis system:

Gas Rate. Cubic Feet per Hour.	Oven Temperature.	Flue Gases Temperature.
370	1050° C.	65° C.
600	1300° C.	105° C.
800	1360° C.	182° C.
1000	1410° C.*	315° C.*

* The rapid rise in the flue gas temperature at this reading is due to the fact that the oven temperature recorded—viz., 1410° C.—exceeds that for which the recuperative system of the furnace under test was designed.

From the above it will be seen how far the "Revergen" principle of town's gas furnace firing goes towards realizing the potential economies of flue-gas temperature reduction. Apart from this feature, however, there is the advantage that, by thus conserving the heat within the furnace casing, a substantially higher temperature is attainable and maintainable from any given gas consumption than in the case of furnaces constructed on the older systems. That is to say, gas as a furnace fuel can be consumed at a much higher rate than heretofore with a degree of economy that ensures commercial sanction for the process—thus throwing open to the town's gas furnace a much larger sphere of usefulness than it has filled in the past.



Section of the "Revergen" Gas-Furnace.

Limitations of space prevent us examining in detail the recuperative system of earlier types of regenerative furnaces, which are adequately dealt with in pamphlet issued by the Davis Furnace Company, and impeached for their inadequacy on the ground of excessive flue heat loss. The new system of recuperation is, however, here described in the inventors' own words; the principle being obviously one of "reversible regeneration," from which verbal combination it may be shrewdly suspected that the name "Revergen" has been derived:

> In the Davis "Revergen" oven furnace, the heat-absorbing materials in the regenerator chambers are first heated by the escaping products, and are then cooled by the incoming air. While one heat reservoir is being cooled, the other is being heated by the escaping gases, thus reducing their temperature and retaining the heat until it is in turn taken up by the incoming air. The air is in this way heated on its way to the furnace; the continuation of the reversion process resulting in the production of a higher flame temperature, with an accompanying increase of efficiency within the furnace, over and above that accomplished by the effective recuperation of the heat of the escaping gases.

The "Revergen" principle of recuperation and firing, besides effecting unprecedented fuel economies, is said to permit of the construction of a furnace which is thoroughly substantial and capable of withstanding the highest temperatures and repeated temperature changes. Not only so, but many features which have hitherto caused annoyance and loss, are entirely eliminated. There are no burners (as generally understood) to give trouble; while the regulation of the proportions of gas and air can be very accurately adjusted by discernment. The furnace can be operated by an unskilled operator, or mechanical or automatic means can be resorted to, in which case the human factor is entirely eliminated.

Construction of the Davis "Revergen" Oven Furnace.

This is described as consisting of an outer casing of sheet steel, bound by channels, tie rods, and thrust plates; the body of the furnace being built-up of best Scotch fire-brick of extra thickness. A counterbalanced rise-and-fall door is provided at one end, or at both ends in cases where the oven is required to discharge the work at the end opposite to the loading door—the door or doors being complete with the necessary actuating gear.

Heating is effected under the "Revergen" principle by town's gas in association with air at a pressure of a few inches water gauge. The reacting elements—viz., town's gas and air—are introduced to the furnace separately, each under the individual control of a main supply-valve, and provided with means for accurate adjustment. Double recuperators, suitably disposed, are built underneath the oven, and are of the precise capacity, scientifically determined, to extract the maximum amount of heat from the escaping gases, and which heat is transferred to the air on its way to the combustion chamber. The operating gear necessary for bringing the recuperators alternately into action is conveniently situated. The arrangement of the recuperator chambers underneath the floor of the furnace is said to ensure a good bottom heat for the working hearth.

High Temperatures Economically Attainable.

Furnace users who recognize the convenience and other advantages of gas firing, and avail themselves of them as far as possible in their works practice, will be the first to appreciate and confirm the limitations of town's gas as a furnace fuel. The economical generation of temperatures above 1500° C., coupled with the even distribution of heat, in large or even moderate sized furnaces, has always presented a problem of considerable difficulty to the furnace designer, and in the case of the highest temperatures, one which town's gas furnaces have hitherto been found incapable of solving. This disability has constituted a serious handicap to the full development of many important and growing industries, and indirectly has also exercised an adverse influence on the expansion of dependent activities—to say nothing of the resulting disadvantage to the gas-furnace proposition as a whole.

It is claimed by the application of the "Revergen" principle, with its highly scientific recuperative system, the erstwhile maxima of temperatures attainable in town's gas furnaces of various types have been vastly improved upon, and this not by means of excessive fuel consumption, but merely by the more thorough utilization of the available heat units generated by the gas consumed in firing under the new system. It will be clear, therefore, that many very important heat treatment operations hitherto alien to the town's gas furnace are now brought economically within its range of commercial utility; and if for no other reason than this, the present patent is worthy to rank as an epoch-making invention in respect of gas furnace development.

It may be observed that the high temperature possibilities of the "Revergen" system—temperatures probably exceeding 2000° C. have been attained—have not yet been fully exploited, owing to the war-time dearth of the extremely refractory materials that are essential to the construction of furnaces for high temperature work. Doubtless, however, this important phase of the invention will receive adequate attention by the patentees in due course.

Application of the "Revergen" Furnace Principle.

Experiments to date have been conducted with a view to demonstrate more particularly the extraordinary economies of the new system as applied to furnaces of the oven type for heat treatment—operations such as case-hardening, re-heating, hardening, annealing and nomalizing, carburizing, billet-heating, and so forth; and the figures quoted in the pamphlet issued by the firm (already mentioned) suffice to justify the strong claims advanced by the patentees in respect of the system, and not less the highest anticipations of furnace users in respect of its commercial utility. Further research, however, has shown that the principle is one that can be applied with equal advantage to furnaces for other purposes, among which may be cited: (1) The heat treatment of refractory materials, the extremely high temperatures required for which have hitherto ruled-out the town's gas furnace; (2) the open hearth or tank method of melting non-volatile metals, in respect of which the advantage is emphasized (and claimed for the "Revergen" system) of being able to reduce certain metals and alloys, principally and almost entirely by radiation; (3) the firing of china clays and porcelain, for which the peculiar quality and character of flame generated by the "Revergen" system more especially adapts the latter; while other important developments are promised from test-room indications which have been scientifically observed.

Some Authenticated Results.

We have been furnished with particulars of a special test of the "Revergen" oven furnace, carried out under the supervision of a Ministry of Munitions official, to enable him to place before the competent authorities convincing evidence of its superiority for the important purpose of billet-heating. It is stated that the whole of the operations were carried out under the direct instructions of the Government representative, who took and recorded all observations, temperatures, gas consumption, &c.—the latter being checked by an independent and authoritative witness, present to satisfy himself as to the claims of the "Revergen" furnace for the purpose referred to. The furnace used was a 4ft. 6in. by

3ft. by 2ft. oven; and the test required that the oven should be brought to a pre-determined temperature (820° C.), and loaded-up with cold billets, the whole being then brought back to the same temperature and so maintained for one hour.

The following are the duly certified results: The gas consumption per pound of billet required to raise the charge to 820° C. was 1·3 c.ft. The gas consumption per pound of billet to maintain the charge at 820° C. for an hour was 0·341 c.ft. Compared with the results of an identical test in the case of the best types of competitive furnace, the following efficiencies were recorded; the percentage of gain in the case of the "Revergen" oven, and the percentage of loss in that of the competitive furnace being also shown:

Raising Charge to 820° C.

Furnace.	Consumption.	Efficiency Gain or Loss.
Competitive . . .	2·5 c.ft. per lb.	92·3 p.ct. loss
"Revergen" . . .	1·3 ,,	48·0 p.ct. gain

Maintaining Charge at 820° C. for One Hour.

Furnace.	Consumption.	Efficiency Gain or Loss.
Competitive . . .	·534 c.ft. per lb.	56 per cent. loss
"Revergen" . . .	·341 ,,	36 per cent. gain

Inclusive Calculation per Ton of Billets Heated.

Furnace.	Gas Consumption to Raise Charge to 820° C.	Gas Consumption to Maintain Charge at 820° C. for 1 Hour.	Total or Operation.	Efficiency Gain or Loss.
Competitive .	5600 c.ft.	1196 c.ft.	6796 c.ft.	84 p.c. loss
"Revergen" .	2912 c.ft.	764 c.ft.	3676 c.ft.	46 p.ct. gain

In computing the percentage of loss, the "Revergen" consumption figure has been taken as representing 100, and the same value given to the competitive consumption, in arriving at the percentage of gain in favour of the "Revergen" oven.

TWELVE-HOUR TEST OF A "REVERGEN" FURNACE.

A table is also available recording the results of a twelve-hour test of the new furnace, carried out under actual factory conditions, for the edification of an independent inquirer, and which is of special interest from the amplitude of the information embodied in it. The calorific value of the gas used during the test is stated to have been 465 B.Th.U. average. Considerations of space, however, compel the omission of this table.

Suffice it to say that the results shown to have been attained by the use of town's gas are of enormous significance; and all things considered, it is safe to assume that this new manifestation of enterprise on the part of Davis Gas-Stove Company [with whom the Davis Furnace Company, Ltd., will be identified by our readers] will give rise to a "certain liveliness" in the furnace world in general, and to the section of it that is concerned with gas-fired furnaces in particular. No one, however, will grudge the inventors any of the credit due to them, or the enhancement of business prestige they are certain to enjoy, in respect of an invention so thoroughly in keeping with the modern trend of industrial progress, and so flattering to the true scientific status and development of gas-heating.

We are asked to add that the "Revergen" principle has definitely passed the experimental stage; several furnaces of various sizes constructed and fired on the new system being now in daily use and showing fuel economies varying from 33⅓ to 50 p.ct. as compared with prior costs, according to the nature of the apparatus hitherto employed.

A NATIONAL SYSTEM OF DECIMAL COINAGE.

A Suggested Two-Place Decimal System, the Adoption of which Involves the Minimum of Expense and Inconvenience. No Alteration of Prepayment Meters is Necessary. It Ensures Ease in Working and it Shows Clear Results. All Present Coins can be Used.

By G. W. LIMMER, of Bournemouth.

THE following article deals with a matter of national importance, and especially so in connection with gas lighting companies. In preparing the system advocated, the writer has had in mind the following points:

1.—A suitable practical system of decimal coinage.
2.—The concurrent revision of our coinage.
3.—The difficulty of gas prepayment meters.

Very many years ago there was, the writer remembers, a more or less serious movement on foot for the introduction of a system of decimal coinage; and, at last, a Commission has, he believes, been appointed to report as to a suitable system of this nature. He is also aware that the Institute of Bankers has recommended a method, which is, however, more or less objected to by the commercial community, on account of the necessity for carrying the figures employed to three decimal places, and the retention of the farthing. He himself, some long time ago, suggested practically the same thing; inasmuch as he proposed to show 2s. 1d. as 1·00 (100 farthings). The system now suggested is that 4s. 2d. shall be the equivalent of 100 halfpence, as, in fact, it is. It is further suggested (and as an alternative basis) that 4s. 2d. shall be represented by the present 4s. English coin. That there is need for introducing some such system is, for obvious reasons, generally admitted.

Several methods, other than the above mentioned, have been put forward from time to time; but any system involving the radical alteration of present coins (either silver or copper) would throw a heavy expense, and very considerable inconvenience, on public lighting companies (unless the nation decided to shoulder the cost), and cause more or less confusion; and there would have to be added the cost of making new coins.

The system recommended by the Institute of Bankers (£1 = 1000 mils or farthings) is, as above stated, very similar to a method previously suggested by the writer; and he has been further considering the position at odd moments. As a result, his suggestion is the adoption of the following method, which does not involve the alteration of prepayment meters or even, of necessity, the coins.

Furthermore, it is applicable in a twofold manner—*i.e.*, we may either make £1 equal to £1 0s. 10d. or let our coinage values remain unaltered.

£1 (of 20s. 10d. value) . .	=	1 × 5 × 100	=	5·00
1s. 1-20th of £1 . .	=	·05 × 5	=	·25
6d.		× 2	=	·12
3d.		× 2	=	·06

In effect, this means decimalizing 4s. 2d. (50d. = 1-5th of £1 new standard); and as 1-5th of £1 is 4s. (present silver standard), it seems that it may naturally be accepted as equal to 100 mals or halfpence ("mals," a contraction of decimals); and it might be designated "dourin" (from double florin). As 1s. is one-fourth thereof, it consequently becomes 25 mals. Now we could make 25 halfpence (the mal equivalent) of the value of 1s. by reducing an article from 1s. 0½d. to 1s. (by reason of the additional value put into the 1s.). But there are one or two objections to this manner of adjusting matters. The principal one is that it would curtail moneys paid as wages, though the lesser number of coins would be of correspondingly higher value—1s. would buy an article hitherto worth 1s. 0½d.

A better method, however, of adjusting the difference in value between the two standards of 24 half-pence and 25 mals, in order to avoid new money is to add the difference to the halfpence; and this can be quickly and easily done (as will be shown).

It is, of course, essential for the purposes of calculations, that all copper coins up to and including 12 pence should be regarded as mals. As to these coins, the difference between the current halfpenny and a mal is so small that it may, for practical purposes, be accepted as 1 mal. Thus, 1d. would equal 2 mals; and so on, right up to and including 12 pence.

To give a simple illustration (as affecting tradesmen and their customers): Supposing tobacco to be (say) 1s. per ounce on the 1st of March, it is only necessary for the community to agree to the above proposal, and the price would be altered to 25 mals, and 1s. would be paid to the tradesman.

Bankers and others would simply need to convert their liabilities and assets, and other accounts, into the new coinage, and conduct all transactions therein.

The writer does not put forward any claim to have considered this matter from the point of view of a financial expert; but, inasmuch as the Institute of Bankers has agreed to consider £1 as 1000 mils, why should not £1 express £1 of 20-10ths as 500 mals?

From a commercial point of view—*i.e.*, in the matter of exchange, £1 is, of course, worth whatever it will purchase.

PREPAYMENT METERS.

The writer will now endeavour to make it clear that, if his suggestions are accepted, it will be quite unnecessary to interfere with the above; and as he is engaged in the offices of the Bournemouth Gas and Water Company, the matter is of interest and importance. The only trouble is to get 12½d. from a machine which takes only 12 pence to yield 1s. (new standard). But this difficulty can be adjusted in several ways without interfering with the meters; because a very large number of them are already set to pass gas at a higher value than is charged. In the case of the Bournemouth Gas Company, there is a margin of 4d. per 1000 c. ft.; and, inasmuch as the surplus is returned to consumers as a rebate, it will be perfectly simple to obtain the halfpenny required to complete the shilling by retaining as much as is required from the discount. Some of the Company's meters are rated at 5s. 2d., and some at 6s. and 4s. 8d. It is possible, therefore, to recover from eight halfpennies the amount required to adjust the difference in each case. Consumers would, of course, take their money (wages or income) in mals; and they would by this means be enabled to forego the halfpence deducted from their rebates. The bankers would be satisfied because they would be paid the extra halfpenny in the shilling.

Other companies may or may not be in quite so favourable a position. In the case of companies who are unable to adjust matters in this simple fashion, and (until such time as a sufficient

reduction in the price of gas takes place) they should be authorized (through their collectors) to demand from their consumers the sum of a halfpenny in the shilling which has been short-paid into the meters. A notice slip to this effect might be affixed to every meter. The amount so recovered could be shown as a separate item upon the collector's receipt. Again it may make all the difference to some companies to take advantage of the ½d. per 1000 c.ft. which arises between the amount charged for gas and the number of cubic feet supplied. For instance, 5s. 2d. meters which pass 16 c.ft. for 1d. give 8 c.ft. too little gas in every thousand; and this is practically equal to ½d. in itself.

An illustration of the working of calculations may now be given: Taking the gas sold by means of these machines—*e.g.*, at 4s. 2d. per 1000 c.ft. At this rate, 1d. represents 20 c.ft. (4s. 2d. = 50d. × 20 = 1000 c.ft.); and 1 dourin = 100 mals; 1 mal = half of 1d., 10 c.ft., or 100 × 10 = 1000. 4s. 2d. at 24 halfpence (present standard) = 100, which is one-fifth of a dourin 5·00 (£, new standard) but one-fifth of the 480 present halfpence = 96. This leaves a difference of 0·04 or, say, 4 p.ct. (½d. in the 1s.) as the sum to be added to the present rate (in halfpence) to make current coins equal to the new standard. This is a perfectly simple matter; and once the conversion is carried out, the new values, of course, remain as is shown in the following example:

With gas at 6s. per 1000 c.ft. show the value of 5400 c.ft. at the old and new standard rates [O.S. = old standard, N.S. = new standard].

O.S. 5400 at 6s. = £1 12s. 5d. N.S. 6s. = 72 × 21·44 (or 6s. × 2½ 15 × 10 + 100 1·50)

Add

1-24th (1-12th of pence) as mals 6

150 × 5·4 =

(1 dourin) 4s. 2d. × 8	£1 13s. 4d.	£8 10 0
10 mals 1-10th of 4s. 2d., or 50d. 5		1 13 9

Coins which equal £1 13s. 9d.

£1 0 0	. . . . . =	£1 0 10	or 5·00
0 10 0	. . . . . =	0 10 5	,, 2·50
0 2 0	. . . . . =	0 2 1	,, 0·50
0 0 5	. . . . . =	0 0 5	,, 0·10
£1 12 5		£1 13 9	8·10

RULE.—If half the number of shillings be taken as pence, the new value is at once given in pence—*e.g.*, 3s. (3s. 1½d.) 37½=·75.

If it is undesirable to alter the English coinage value, this method of £1 0s. 10d.=5·00 could still be used. It would make but little difference as regards the number of coins to be handled. There would certainly be no occasion to issue new money, except in the ordinary way.

The writer does not propose at the moment to go into the matter of shortened methods of working; but he would, in conclusion, like to add a word as to the coins in circulation. At the present time, English coinage is without doubt considerably overloaded; and one could get along very comfortably with the following coins only: Gold, £1 and 10s.; silver, 4s., 2s., 1s., 6d.; copper, 1d., ½d. The new standard values of the above would, of course, be: £1, 10s., 4s., 2s., 1s., 6d., 1d., ½d. (10 pence added to £1) 250, 125, 50, 25, 12½, 6, 1, ½.

If the sixpence (silver) is retained, as it ought to be for the time being, in order to obviate the necessity of using several pennies, it will (as shown above) rank only as equal to 12 mals of halfpennies. But two sixpences should equal one new shilling for exchange (*i.e.*, value), because the latter=25 mals or 2 sixpences =1s. Useful new coins would represent 1/5th (2½d., or 5 mals) and 2/5th (5d. or 10 mals) of 1s. These are not, however, at all essential.

It is hoped that this matter has been made sufficiently clear, and that someone in the gas profession of sufficient weight (such as the British Commercial Gas Association) will put this suggestion before the proper authorities.

We are advised by the Hon. Secretary (Mr. H. C. Head) that the meeting of the Southern District Association of Gas Engineers and Managers will be held in the Connaught Rooms, Great Queen Street, W.C., on Thursday, March 13, at 3 o'clock. It will be preceded by lunch at 1.15.

At a meeting of the Midland Junior Gas Association next Thursday evening, Mr. W. A. Twine, A.I.C., Assoc. M.Inst.Mech.E., Chemical Plant Superintendent to the Birmingham Corporation Gas Department, will read a paper on "Dehydration Processes for Various Tars." The meeting will be held in the Council House, Birmingham.

A table prepared by the Department of Coal Supplies shows the output in 1913 to have been 287½ million tons, in 1917 248 millions, and in 1918 226½ millions. The home consumption in the three years respectively was: 162 million tons, 159 millions, and 145½ millions. It is estimated that the 162 million tons for home consumption in 1913 were distributed roughly as follows: Locomotives, 13½ millions; iron, steel, shipbuilding, and engineering trades, 15 millions; blast-furnaces, 21 millions; other metal trades, 1 million; textiles, 9½ millions; clothing, 1 million; food and drink, 4 millions; chemical and allied trades, 4½ millions; paper trades, 2 millions; leather trades, ½ million; timber trades, ½ million; building, clay, and allied trades, 7½ millions; gas-works, 17 millions; electricity works, 4 millions; domestic, mercantile uses, &c., 61 millions.

MANCHESTER AND DISTRICT JUNIOR GAS ASSOCIATION'S VISIT TO THE NATIONAL GAS-ENGINE WORKS.

About 70 members of the Association last Saturday visited the Ashton-under-Lyne works of the National Gas-Engine Company, and were received by Mr. Scholes and Mr. Orme, Directors. They then divided into several parties, and, under the guidance of the Directors and members of the staff, were conducted round the works—visiting the power-gas plant, and case-hardening plant, heated by low-grade gas of 135 B.Th.U. Here were two gas-fires supplied with the same gas at 8-in. pressure, with good results, as well as two incandescent burners, the mantles of which were in a satisfactory state of incandescence. The consumption of gas in the fires was 100 c.ft. per hour. Passing from here, the white metal and other departments were inspected, some two-and-a-half hours being occupied in the tour. A description of the works has been received, but pressure on our space compels the postponement of its publication.

The members re-assembled in the large drawing-office to partake of tea at the invitation of the Directors of the Company. Mr. H. Fletcher (Garston), Junior Vice-President, then announced that the President (Mr. C. E. Teasdale) was indisposed, and unable to be present.

Mr. J. M'NICHOLL (Mossley) proposed a vote of thanks to the principals and members of the staff for the privilege afforded of visiting the works. He said that the part played in the gas industry by the National Gas-Engine Company was not to be wondered at, when one thought of the fierce battle raging in the power section. For small powers, thermal efficiency held its own; but for large powers, some engineers said the steam-engine was more reliable. He hoped this would soon be remedied. Heating with gas, he thought, was pre-eminent. With respect to the gas-turbine, he had heard that this was impossible; but he recollected having read that one had been introduced either in France or Germany, and wondered if the Company had any information on this point.

Mr. G. DIXON (Wallasey) seconded; remarking that gas power was most important to-day. Recently he had seen the specification for an engine which was to run on town's gas of 600 to 700 B.Th.U. He thought some alteration was needed here.

Mr. WOOD (Works Manager), on behalf of the Directors and his colleagues, thanked the members. He was sorry they had come at a time when they were just changing-over from war conditions. They had not been making gas-engines to any extent during the last four years.

Mr. C. J. WOODHEAD, Assistant Engineer to the Huddersfield Corporation Gas Department, then read a paper on the "Handling of Coke." This, with a report of the discussion, will be found on p. 391.

PRESENT AND FUTURE OF GAS.

POSSIBILITIES OF CARBONIZATION OF ALL COAL AT LOW TEMPERATURES.

By S. W. PARR, Professor of Applied Chemistry at the University of Illinois.

[**A Paper read before the American Western Society of Engineers.**]

If I were asked to select a text or a creed, or an article of faith, for this organization, I think I could not do better than offer the well-known quotation from an address by Sir William Siemens, delivered in 1881, which reads as follows: "I am bold enough to go so far as to say that raw coal should not be used as fuel for any purpose whatsoever, and that the first step towards the judicious and economic production of heat is the gas-retort or gas-producer, in which coal is converted either entirely into gas or into gas and coke, as is the case at our ordinary gas-works."

If this was true in 1881, and if there was sufficient development at that time to warrant such a sweeping prophecy, then certainly to-day there is tenfold more reason for believing in the soundness of his forecast. Note more especially his statement "that raw coal should not be used as fuel for any purpose whatever." This proposition, whether visionary forecast or sound theoretical doctrine or actual obligation for technical procedure, I thoroughly believe in. If this is accepted as a major premise, then we are ready to formulate a first corollary to our creed as embodied in the above quotation. It is this—the prime function of the gas industry is that of a purveyor of fuel. It is true that the primary idea in the gas business was to furnish light; and in this capacity it has had a fine record and an honourable career for more than a hundred years. But does not the gas industry sometimes take on the attitude of a man who has been long and intently gazing at a fan-tail flame or an incandescent mantle? When he turns his face away, even though he closes his eyes, he can still see only a hazy outline of a fan-tail flame or an incandescent mantle.

GAS INDUSTRY A MISNOMER.

Before entering upon further discussion of this proposition, it will be well to outline another proposition—perhaps another corollary to what has preceded. It would be this: The interest we represent has been misnamed "The Gas Industry." As a matter of fact, we are or should be, engaged in the manufacture

of certain commodities, in connection with which gas is produced incidentally as a bye-product. The other commodities, therefore, should "pay the freight"—the overhead, the fixed charges, and the profits. Anything, therefore, in addition which the gas could bring in would be all to the good. If these things could be actually realized, then the goal of a gas company's ambition would be, not a dollar-and-a half rate, but rather a half-dollar rate, so that the larger yield of these "other" profit-producing things might be in evidence.

Analysis of Raw Material.

These are altogether radical, possibly also heretical, statements. Let us see if they have any scientific basis or evidence of any sort tending to furnish proof, even in any mild degree, of their sanity. First, then, as a help toward an analysis of the situation, let us turn to an analysis of the "raw" material with which we are working—an analysis possibly of a little different sort, or perhaps we should better say an analysis with slightly different interpretations from those to which we are usually accustomed. It also will serve our purpose to base our considerations upon an Illinois coal. In the table, the various components are shown as consisting of ash, water, volatile matter, and fixed carbon or coke. Let us in this connection recall the fact that these components are not present in the coal as such; but we may obtain them in the forms designated by subjecting the raw coal to a red heat. That is to say, there is substantially no free carbon in the raw coal—that practically all of it is combined chemically with hydrogen or with hydrogen and oxygen. Similarly, there is no volatile matter in the original coal. That which we get out of the coal as volatile matter we make by disrupting the solid material and re-arranging the atomic relations in such a way that some of these remain in the gaseous form.

Now, the order of these new arrangements admits of almost infinite variation; and every order has its own peculiar property and value. Naturally, also, any of the changes in order cannot take place when the elements are in solid form, such as exists in the natural coal; nor are any changes to be looked for in that portion of the material which remains in the solid form as coke. It follows, therefore, that these numerous interchanges of position must take place in that portion which is mobile, so to speak—that is, the volatile matter.

It is a little strange, I think, that in this zone of potential variations, considering the possible values involved and the readiness with which an almost endless number of changes may be brought about, we have gone along for an even hundred years maintaining one single set of conditions, and producing again and again the same brief list of products, which also in many respects lead all others in inferiority as to intrinsic worth.

Average Constituents of Ten Illinois Coals.

First Zone.

Fixed carbon, 49·4 p.ct.
Total volatile matter, 35·6 p.ct.
Moisture, 7 p.ct.
Ash, 8 p.ct.

Second Zone.

Combustible volatile, 21·6 p.ct.
Inert volatile, 14 p.ct.

Total carbon, 67·4 p.ct.
Hydrogen, 3·6 p.ct.
Sulphur between 1 and 2.

First Hundred Years of Practice.

For more conveniently illustrating some of these characteristics, let us refer to the table, wherein we may let the first zone represent the first hundred years of practice. The component parts, very briefly described, would run about as follows:

(1) *Water*—a rather high percentage of it (say) 8 to 12 p.ct., in Illinois coals. However, in itself having neither value nor yet any harm, except as it has to be included in the freight charges and paid for as coal in the final settlement for raw material.

(2) *Volatile Matter*—with something over 5 c. ft. of fixed gas to the pound to its credit, *plus* certain condensible products in the way of ammonia water and tars of somewhat indifferent value.

(3) *Coke*—not always of a quality to excite enthusiasm on the part of users, but still a saleable commodity, if its properties and virtues were adequately set forth by propaganda methods.

Analysis of Second Zone.

Now, the second zone is one of prognostication, of possibility, of research, perhaps of new development, and, let us hope, of some progress in accomplishment during the second one hundred years to which we are looking forward.

(1) There also is here water, no better and no worse than before.

(2) There is the volatile matter, which, as we have already indicated, is the area of modification and of new possibility. It has been pretty well demontrated by investigators, both in this country and in England, that under suitable conditions this area may be made to yield, first, and doubtless of co-equal, if not of greater worth, not tars of the ordinary type, but more properly oils with an absence of inert and inferior compounds, and a wealth of potential development and modification almost bewildering to contemplate—a hunting ground for the investigator without parallel in both interest and importance. For example, in volume it is fully double that of the tars as ordinarily produced, yielding from 23 to 25 gallons per ton from Illinois coals, and as high as 45 gallons from coals of the Eastern Kentucky type. Instead of a specific gravity of 1·2, these condensates may be produced with a specific gravity that scarcely reaches 1. They are, therefore, high in the lighter fractions, low in their pitch constituent, and carbon in the free state is practically absent. It hardly is necessary to enlarge upon the advantages which may reside in this material. The simple enumeration of the qualities already given suggest features of possible interest to the dye and automobile industries, to the wool preserving interests, to road work, &c. But not the least in importance, to my mind, is the readiness with which these oils lend themselves to decomposition and re-arrangement into other substances and other values. Studies in the field of such transformations have been greatly stimulated in recent years.

By way of illustrations, we might recall what has been accomplished in a different field, but upon material having even less susceptibility to change. The hydrogenation, for example, of oil and fats, such as cotton seed oil and lard, has resulted in the production of other compounds of greatly enhanced value and popularity in the culinary art. Similarily, it has been demonstrated that hydrogen may also be introduced into these oils or condensates from the volatile products of coal decomposition, so that a door seems here to be opened whereby we may increase the amount of the lighter and more volatile oils. This retention or introduction of hydrogen into any compound lowers its specific gravity and also its boiling-point; and these two properties are fundamental for that type of fuel upon which the automobile and air-plane industries are based.

Possibilities of Light Oil Recovery.

On the other hand, hydrogen as a gas in the free and uncombined state is rather poor stuff. We measure its heat value per unit volume, which is low, at the foot of the list, 326 B.Th.U. per c. ft. But kept in the fluid form it tops the list—more than 62,000 B.Th.U. per lb. Metaxylene has a boiling-point of 139. If now we introduce hydrogen or substitute hydrogen for one of the methyl radicals, we shall have toluene with a boiling-point of 110. If we replace the other methyl by hydrogen, we have benzene with a boiling-point of 80. Just what the limitations are in this process of hydrogenation, no one can say. The field is too new for making even an intelligent forecast; but suppose the light oils of the benzene type which now show a yield of 2 to 3 gallons per ton could be increased to 10 gallons. The potential motor spirit from the coal output of Illinois would be about one billion gallons.

If Scotch shales can be worked at a profit for their oil and ammonia alone, where the oil content seldom exceeds 20 gallons per ton, why not Illinois coals with a yield of 25 gallons, with the ammonia as well as gas and coke for bye-products?

Action of Sulphur.

The above discussion, however, by no means exhausts the interesting possibilities which lure the investigator. I will only mention one other connected with this volatile zone; and that is the behaviour of the sulphur. We know pretty well what its habits have been for the past hundred years. I believe that in some respects it could be induced to mend its ways. By proper handling, for example, a very considerable proportion of the sulphur can be induced to go along with the tar, thus lowering the amount left to distribute itself in the coke and gas. Then, again, practically all the sulphur which is going off with the gas leaves the coal at a temperature below 600° C. The question at once arises, could we fractionate the gas even from Illinois coals, and draw a line between the first portion which we might call sour or sulphur gas and the next portion which is sweet or sulphur-free? The line of demarkation would come somewhere very soon after the first cubic foot per pound is discharged. Certainly, some interesting possibilities connect themselves with the above-cited facts.

I cannot leave this fruitful zone of volatile material without one further reference, and that is to the line of demarkation between the "rich" and the "lean" gas. As you well know, this occurs at somewhere about 650° or 750° C. I raise the question as to what is the good of the lean gas. To my mind, it is more than a figure of speech to say of it, "The game isn't worth the candle." It is here that the highest heat for the longest time must be applied, where both time and heat are vital operating factors. Then, too, hydrogen again is chiefly what you get out; and, certainly, here hydrogen in some other form or combination is worth more than when in the form of a gas. Here is where the improvement in the properties of coke is to begin. It seems to me, as it must to you, that we have only touched the fringe of the possibilities that await the persistent investigator in the field of gas engineering.

Midland Association.

Thursday, March 13, has, the Hon. Secretary (Mr. W. G. S Cranmer) announces in a preliminary notice, been decided upon for the annual general meeting of the Midland Association of Gas Engineers and Managers. The place and hour are the Grand Hotel, Birmingham, at 2.30.

SCOTTISH JUNIOR GAS ASSOCIATION.

(WESTERN DISTRICT.)

At a Meeting of the Western District of the Scottish Junior Gas Association held in the Royal Technical College, Glasgow, last Saturday, Mr. W. J. Lennox, of Falkirk Gas-Works, read a paper entitled "Repairs and Maintenance" in Gas-Works. The President of the Association, Mr. Thomas G. Moffat, of Tradeston Gas-Works, presided.

ALTERING AND REPAIRING GAS-WORKS PLANT.

Stoking Machinery.

The cost of the upkeep of stoking machinery is always a very heavy item in gas-works expenditure; it is also a very important part of the plant. If the machine breaks down often, or if it is not efficient, it then becomes a serious matter for those in charge. I have not yet seen the stoking machine that was free from these troubles.

I have had some experience with a Fiddes-Aldridge machine; one of the old type—that is one of the first machines that was made. This machine consists of a frame of angles and channels running on a trolley propelled by an electric motor. The motor works all the different gears—one for travelling along the floor, one for hoisting the machine to the level of the retorts, and one for pushing out the coke and putting in the coal. The part of the machine which pushes out the coke and puts in the coal is called the chain. It consists of vertical parallel plates held in position by arched stays, and hinged at the outer edges at the top of the plates. This chain is wound round a hexagon-shaped wheel, which operates the chain. From the arched stays are suspended push plates, so that when the chain enters the retort the plates are held in a vertical position, but when withdrawing they swing-back over the fresh charge of coal and level it in the retort.

The front part of the chain is of heavier construction; and it is here that I made the alteration. The push plate at the head or the front of the chain was fixed the same as the others on the chain. When pushing out the coke it was held vertical by two heavy studs in the inside of the chain plate. At that end on the plate was fixed a light bar called a togal, because it touched the bottom of the retort on the return stroke of the machine. This was the cause of the trouble. When being withdrawn from the retort, it ploughed through the charge and drew a lot of coal back with it, causing considerable labour in lifting the coal off the floor, and also making the charge of coal much less in the retort. To overcome this, I had a new head formed in our own workshop. Instead of the front being in one piece, I had it made in two, with hinged ends, to fit a similar one on the plates of the side, instead of the arched stays. I then put a heavy bridge of 2 in. by 3 in. mild steel on the top of the side plates, with a projection in the centre high enough to clear the top of the coal in the retort. When discharging coke, both halves met and pushed out the charge; and, when coming out of the retort, opened parallel with the sides of the chain and left a nice level charge, and did not bring back the coal—saving a lot of labour and putting a heavier charge of coal in the retorts. I may mention that before the chain was altered, the charge of coal was 8 cwt.; after the alteration, the charge was 10¼ cwt. The fact of the charges being heavier gave better results and more satisfaction.

Having altered the chain to take in more coal, we were in a difficulty about the holding capacity of the overhead hoppers. With the 8 cwt. charge, we had plenty for our needs; but when we got in 10¼ cwt., this caused us to be short of the needed quantity. After some consideration of the matter, we resolved to raise the conveyors 2 ft. above the level of the hoppers. The conveyor was fitted on to the cross beams of the hoppers, and almost on a level with the sides. The coal had very little fall; and there was an empty space in the hoppers. When the coal was levelled in the hoppers, each hopper held 2 tons more. Having got all the material ready, we took the conveyor to pieces, cut out the rivets that held the conveyor frame, removed all the beams, and fitted in the new frame 2 ft. above the level of the hoppers, cut away 2 ft. of the shoot that dropped the coal from the elevators, fitted in the conveyor, and made the job complete in 36 hours. This alteration gave a good supply of coal in our hoppers.

We had a telpher in the works which gave us a lot of trouble. The guide wheels where the ropes wound on the drum of the hoist used to get fixed. The wheels worked on a right-and-left screw; this being set to suit the travel of the rope on the winding drum. When the man went to oil these, he would turn them round to get the oil-holes, with the result that the wheels would be left at the end of the threads. After the ropes would be about half-wound, the wheels would get fixed, and the ropes would slide over them, causing a great strain, which destroyed them in four or five days. The ropes were very expensive, and usually broke in the night-time, causing a lot of trouble. I took out the right-and-left screw and fitted in a plain steel shaft, and bored and bushed the wheels. This cured the trouble, and the ropes lasted longer. The right-and-left screws, which cost 16s. each, were no longer required.

Repairing a Holmes Valve under Pressure.

The valve was on the inlet of a rotary scrubber. Not having been used for some time, it was very stiff to open. The attendant was told-off to open the bye-pass and shut the valve. The valve being stiff, he used a bar, overhauling the thread of the spindle nut, and also broke the bye-pass spindle at the neck. The scrubber was in a very bad condition, and it was impossible to keep it working. I had a piece of sheet-iron cut to fit between the bolts in the flange, removing all the bolts but two—these I kept in for a guide. I took the nuts as far up the bolts as I could, and inserted taper wedges between the flanges of the valve and the pipe, opened sufficient to let in the piece of sheet-iron, taking care to have it long enough to bend down to make it easy to withdraw. I had a new nut cast, bored it out, cut a thread to fit the spindle, fitted in the discs, and withdrew the sheet-iron. I then got the valve closed. The bye-pass was repaired in the same manner.

Making a New Discharging Machine.

At Falkirk, we had two of Dempster's stoking machines—one for charging the coal into the retorts and one for pushing out the coke. We took out the charging part of the machine some years ago and fitted a De Brouwer. This gives more satisfaction, and puts in a good charge. It is much cheaper in upkeep and cost very little, as we used the frame and fittings of the old machine. The discharging machine or pusher was a constant source of worry and very heavy upkeep. The steel wire ropes that worked the ram and telescope broke every seven or fourteen days, according to the kind of coal we were using. We resolved, therefore, to make a new machine of our own design. We took out the telescope and ram, altered the old frame, and got a long watertight box made to fit the frame. The inside of the box (11 in. by 9 in.) has two angles riveted, which run the whole length. The angles are used as a guide for the solid ram, which is 3¼ in. diameter, on which is fixed a cast-steel block with strips of gun metal, 1½ in. by ⅜ in., fitted on top and bottom with ½ in. set pins. In this block are fitted four studs, having flanged nuts which hold the ropes, for pulling out and pulling back the inside ram. The ropes are of $\frac{7}{16}$ in. ploughed steel wire, and are fixed on the guide block at the end of the ram. The ropes are carried to the front of the telescope, and are taken round grooved wheels, which are fixed on a bridge with a centre pin for the wheels to work on. The ropes are taken to the back-end of the telescope and fitted to the frame of the machine with a swinging bar and a strong spring. Should one of the ropes get more strain than the other, the swing bar adjusts the difference, and makes the strain on each of the ropes the same.

The ropes for pulling the ram back are fitted in the same manner; but instead of being fixed at the back of the frame, they are fixed at the front. The outside telescope is worked by a ratchet fitted on the top. The ratchet is bolted on with countersunk bolts, and is made of cast steel. The power for operating the telescope and ram is transmitted through a worm gear by a 10 H.P. electric motor fitted on the top of the framework between the motor and the worm. A Hele-Shaw friction clutch is fitted, and is set to slip at a certain overload. On the shaft through the worm wheel is a right-and-left positive clutch pinion. The right clutch is for raising and lowering the machine to the level of the retorts, and the left is for pushing the coke out of the retorts. These clutch pinions work into spur wheels. For working the ratchet, there is an intermediate wheel geared into the ratchet on top of the telescope. This drives the pusher in and out of the retort. The ram is water-cooled. The inside of the telescope is watertight. The ram works through a packing gland. On the end of this is fitted a steel head, the shape of the retorts, but a little smaller, to allow for carbon deposits.

For driving the machine along the floor a 4 H.P. motor is used. This motor is coupled to a worm gear, which gives a smooth drive. Both the motors of the machine are controlled by a barrel controller of the tr[illegible]vay type. On the old machine there were two controllers—one [illegible]or operating the pushing gear and one for the travelling gear. One controller is used only on the new machine. A cross-over switch was made to do away with the second controller. It is only a matter of turning a handle at the top to change from one motor to the other. This cross-over switch was made out of an old controller that was of no use. The switch consists of a cylinder of fibre, on which are fitted copper segments taken from the old controller. The segments go almost round the cylinder. The wires from the machine controller are fitted into fixed contacts. There are three sets of contacts—one for the travelling motor, one for the pushing motor, and the constant set of contacts when the man in charge of the machine changes the handle on top of switch to the position of travel, which is marked on the top plate. The controller is then in connection with the travelling motor, and the change-over to the push motor is done in the same way. This switch has been in constant use for 2½ years, and has never given any trouble, nor has it cost anything for repairs.

The making of this controller cost nothing but the time. The whole machine was made in our own workshop, under the supervision of Mr. William Wilson. All drawings were done by him. The machine has only twice been out of commission—once in order to get new channels for the old ones that were left in the frame at the time the machine was made, and once to get new sheet bolts in the ratchet. We keep all the spare parts required, such as pinion shafts, &c. These are always ready to fit in as necessary. A set of four ropes lasts three months in winters time, and much longer when we are on light load. A set of ropes can be put into a machine in an hour, as against three in the old machine. A new ram costs only £5, as against £22 for the old machine. There is a saving of 75 p.ct. on the new machine. If

we had good coking coal, I am quite confident the machine would give an excellent account of itself. This machine is patented by Mr. William Wilson, now the Engineer and Manager of the Burton-on-Trent Gas-Works.

DISCUSSION.

Mr. J. BELL (Dumbarton) said that he was interested in the paper read by Mr. Lennox. It was a real, good, practical communication. There was no doubt that stoking machinery as applied to the working of horizontal retorts was going to be very hard to beat. The unfortunate thing was that such machinery was not so well adapted to Scottish works using Scottish coals. The Fiddes-Aldridge machine was one of the best of its kind; and it would be an advantage if some idea could be incorporated in it in such a way that the coke would not need pushing. In pushing the coal into the retort, would it not be a simple matter to put the pushing apparatus into the charge, and draw it out? If this could be accomplished, there was a greater field for such machinery in Scottish gas-works. The Arrol-Foulis machine was really what one would consider most adaptable to Scottish coal. In it they had a drawing process, and not a pushing process. When they went in for pushing machinery they had to restrict themselves to coking coals. There was very little supply of these coals in Scotland. He had no doubt that Mr. Lennox had had some considerable trouble in the past when striving to push the charges from Scottish coals, especially when they had been lying in stock for some time. Since there was such a restricted field for pushing machinery in Scotland, and since there was a lack of machinery for dealing with Scottish coals, it brought down a charge on their own heads of lack of initiative. Probably English firms had had greater experience in the construction of such machinery; and they might provide apparatus which would draw out the charge.

Mr. JOHN TAYLOR (Glasgow) said he had been specially interested in the remarks of Mr. Lennox on the life of the rope. He thought this life was very short indeed. For one thing, the pulleys should be increased in size as much as possible. How was the rope treated before it was put into the machine? He would suggest that the rope should be saturated in oil—getting the oil into the core. By this means they would reduce friction. The oil would get in between the wires, and the life of the rope would be extended. Any old oil savings should be stored up in a barrel for the purpose.

Mr. MOFFAT (Tradeston) said that in Tradeston they had been so well used to the Arrol Foulis machine that it gave them good satisfaction. When one was used to it, it was quite easy to repair it. They had discarded the ropes, with the exception of the heaving ropes. They used nothing but chain ropes; the wire ropes being an endless trouble. Certainly, the pulleys were inclined to be too small. Makers could say what they liked regarding the tensile strength of the steel; but if there was not a proper core in the centre, it would not go over the pulleys. Chains were much more satisfactory for the Arrol-Foulis machine. Talking about putting the wire ropes in oil was one thing, and working with them when they were oiled was another. They very seldom had a stoppage at any length of time at Tradeston. If they repaired a machine thoroughly in the off season, it ran without any serious trouble untii the following season. One point in the paper showed great ingenuity—the taking of the carcase of one machine and turning it into another. He did not quite understand the nature of the broken valve. Was it a rack-and-pinion valve?

Mr. LENNOX, in reply, said he agreed with the difficulties of the pusher type of machine in regard to Scottish coal. There were only three classes of coal that their machine utilized—Bannockburn, Climpie nuts, and Batten peas. These coked very well, and gave them no trouble at all. In reference to the remarks made on ropes, he might say that in constructing the machine they took into consideration the diameter of the pulley wheels, so as to give the ropes the best possible chance. There was no sharp bend. Their ropes were not saturated in oil. They had only two rack-and-pinion valves in Falkirk. The rest of the valves were Holmes valves. The valve referred to had not been opened for many months. There was no pusher—not even the De Brouwer, which he considered the best—that could go through the same amount of work as the one at Falkirk. The coal he had used in England was screened coal, and the coke came out about as long as one's body.

Mr. MOFFAT, in conclusion, said that the remark had been made that in 1911 he had contended that stoking machines would soon be a thing of the past. He still maintained it. In 1911, they had few vertical installations in Scotland. Was it necessary for him to mention the works throughout Scotland which now had vertical installations? They had them all over Glasgow; and they were going to put down more, for the simple reason that they were almost economical, giving the greatest amount of gas for the smallest amount of labour, which was a consideration in these days. No doubt, of course, stoking machinery would last a few years longer. They were sore on the retorts. A good vertical installation—if properly constructed—did not cost a great deal in the way of repairs. He said a "good installation." They hoped to have some very shortly in Glasgow. The Gas Department were really wakening up.

Addressing the Leeds Chemists' Association on "New British Chemical Industries," Mr. S. W. Woolley, editor of the "Chemist and Druggist," detailed the many directions in which products which had formerly been German and Austrian monopolies were now manufactured satisfactorily in England in sufficient quantity not only to meet our own needs, but to allow growing exportation. As to future conditions, he suggested that although we as a nation hesitated to have anything further to do with the Germans, we would have to live in the world with them and would have to do some trade with them if we were to get a tithe of the amount of reparation which they would be called upon to pay. One of the best protections against German commercial aggression would be not so much Customs tariffs as concentration on education of British chemists to a standard which would enable them to meet competitors from any part of the world.

HANDLING OF COKE.

By C. J. WOODHEAD, of Huddersfield.

[A Paper read before the Manchester and District Junior Gas Association, Feb. 22.]

When I promised to prepare a paper on "Coke Handling," I had particularly in mind two plants which were a distinct departure from usual practice, the evolving of which I was to a great extent responsible for, and one of which has since been the subject of an article by Mr. G. R. Zimmer in "Engineering." I had partly prepared my paper when this article was published; and though I was undecided about continuing with it, afterwards I made up my mind to proceed, as there are points missing from Mr. Zimmer's article which I think will be of interest.

The question of mechanically handling coke in gas-works is one which amply repays thoughtful consideration; for I firmly believe it is possible to evolve a plant which will be practically free from breakdowns and their attendant troubles, economical both as regards cost of maintenance, and percentage of breeze due to handling—in fact, a plant which will give perfect satisfaction; and last, but not least by any means, complete freedom from anxiety and worry. It has been the custom to class this type of gas-works plant as a necessary evil, on account of the difficulties there are to contend with, due to the gritty nature of the material to be handled, the corrosive action of the steam (which action also extends to the other ironwork in the retort house), also the manufacturing of an excessive quantity of breeze, which amounts to a great loss of revenue when calculated over a year's working.

COKE PLANT OF THE FUTURE.

In this paper I venture to suggest certain lines upon which I think coke plant of the future may be developed, which will also bring mechanical coke handling within the scope of much smaller works as a profitable proposition. At the present time there is great scope, as new plant will be pretty universally required, due to the difficulty in getting new plant, or even renewals, during the time the war was on. Most coke handling plants will no doubt be in a very bad state of repair; and I trust my few suggestions may be of some assistance in the evolving of efficient plants. I would strongly recommend those who are proposing to instal new plant to keep one idea constantly to the fore—that is, to reduce the number of working parts to an absolute minimum.

As some of you will no doubt be aware, my experience has been gained from the contractor's side as well as from the gas engineer's side; and it has struck me very forcibly what a great difference there is between the two views as to what constitutes a good and efficient plant. The point I would like to emphasize is that I am certain it would be to the benefit of the gas industry in general if there was closer co-operation between the gas engineer and the contractor in the design and the detail of the plant. To bear out my contention, I may say that the evolving of the two plants I am going to put before you, which are in both cases a distinct departure from the usual practice, was entirely due to some suggestions made by the gas engineer to the contractor in each case, and the ideas worked out together, with, I think you will agree, satisfactory results.

In the majority of cases, a contractor puts forward a design and estimate for a plant, generally in accordance with draft plans prepared by the engineer, or to meet the engineer's requirements, which may have been given by specification or verbally; and the order may be placed on price, or one contractor's design may meet with the engineer's approval, due to some speciality being introduced, and the question of price become a secondary consideration. Or it may be that the engineer, after viewing various plants, or from previous experience, may prefer some special kind of apparatus which entails the placing of the order with a certain firm of contractors if they happen to hold a monopoly of this type of plant.

However, the order being placed, the contractor's draughtsman proceeds to detail the plant to a great extent in accordance with what has been done before as far as he can, in order to save work in the office, the cost of patterns, &c., and general manufacturing cost in the works. The plant is then made and erected, though, of course, in some instances drawings are submitted for the engineer's approval before the work is proceeded with by the contractor. But seeing a plant on paper and the actual working of it are two very different things, and unless there is a great deal of collaboration between the gas engineer and the draughtsman who is getting out the drawings, the only good purpose served in submitting the drawings is that the engineer will have a set to refer to in case of repairs, renewals, &c., being required after the contractor has left the plant.

The plant is started; and if it does its work satisfactorily during the period of maintenance (which is usually very short with this type of plant), the contractor then withdraws all his men, and leaves the plant in the hands of the gas-works staff, who will gain the experience by working that the contractor's draughtsman ought to gain in order to assist him in designing future plant better as regards cost of maintenance, reliability, accessibility, &c. The men who gain the experience, especially on a works where they do their own repairs, rarely have the chance of putting their knowledge to any good use, except as far as their own plant is concerned.

Now accessibility has a great bearing upon the cost of a plant as regards maintenance charges; for in a great many cases there are points which require attention where it is necessary either to climb, or obtain, a ladder in order to attend to same. If the man who is attending to the plant has to go to some trouble to reach this point, it is more than likely he will do it very seldom, and excessive wear is taking place through this neglect; whereas if there was a proper platform or ladder fixed to enable him to get to this point without trouble, it would be better looked after by him, and also render supervision very much easier.

The practice of placing an order with the lowest tenderer has a great deal to do with the fact that insufficient consideration is given to the details, and to what one might term the refinements of a plant, as the work would entail so much more cost that a contractor who made allowance for it would be hopelessly out of the running as regards price. If an engineer stipulated, when asking for tenders, that contractors must also tender for the maintenance of their respective plants over a period of one, two, or three years, the tendency would be to evolve a plant requiring the minimum of attention, low cost of renewals, and practically free from breakdowns, and which would give satisfaction during the whole of its working life, not just when it was practically new. This method of tendering has been already tried with regard to other class of gas-works plant with satisfactory results; and I do not see any great objection to the same idea being carried out with regard to coke plant.

TELPHER PLANTS AND COKE QUENCHING.

The most difficult proposition a designer has to face, especially now-a-days with the adoption of heavy charges, is the thorough quenching of the coke; for it is a well-known fact that the result of suddenly quenching incandescent coke by means of a large volume of water is to create an excessive amount of breeze. One has only to watch a telpher skip being lowered into the quenching tank, and see how the particles of coke fly when the hot material comes in contact with the water, in order to obtain an idea of the large amount of breeze due to this cause. The telpher plants as installed in a great many works for handling coke have many advantages over conveyors, as the few working parts, reliability, and small cost of maintenance to a great extent counterbalance their shortcomings. In the present days of stoking machinery, it is possible to discharge and charge retorts at a rate of from one to two minutes per retort; and the coke plant should deal with the coke at this speed in order that the retorts may be open for as short a time as possible. Where there are (say) a dozen beds, the time taken by the telpher to convey the coke to the yard, quench, and deliver it to stack or hoppers as the case may be, and return for the next load, is such as to slow the whole cycle of operations very considerably, though, of course, it is possible to have more than one telpher. But this also means more men, which we are out to avoid. Then there is the question of quenching, which, as you are aware, is accomplished by submerging the skip and coke in a tank of water, where the coke is saturated, split-up, and a great amount of breeze manufactured, which requires a lot of cleaning-out of the tank. The question of loss of time, and the method of quenching, are to my mind the two main shortcomings which require eliminating to make the telpher system satisfactory; and I would like to put forward a suggestion which I think might overcome these shortcomings.

A QUENCHING TABLE SUGGESTION.

The method I would suggest would be to have a quenching table immediately outside the retort-house, at one or both ends, or to go through the side wall of the house at different points, with at each point a quenching table, on which the coke would be spread before any quenching takes place, and where it could be quenched at leisure, and by a much less quantity of water. After the draw is completed, the coke could be run off the benches or quenching tables into skips, which the telpher would pick-up and convey to hoppers, stack, or other destination—the coke being perfectly quenched and cooled, not saturated.

Another point, which is very important, is that the coke from the draw is coming out of the retort-house in large quantities for a short time only, and the conveying and screening plant has to be of large capacity to deal with the coke at this speed; while if the screening, &c., can be spread over the whole time, a very much smaller plant will do the work.

With regard to conveyors, this drawback of having a large capacity plant, which is necessary to deal with the great amount of coke in a short time, is more pronounced; and there is the additional fact that the plant is running only partly loaded most of the time. Sometimes, especially if there is a hitch in the retort-house, it may run empty for a considerable time—in fact, I have known instances where the coke plant has run for over half-an-hour empty, and, of course, wear and tear is going on the whole time. With the general adoption of large charges, the coke-conveyor has got more and more unwieldy, until in some cases I am sure 50 p.ct, of the wear is due to the weight of the conveyor chain alone; and the cost of maintenance has mounted up to a very stiff figure.

COKE HANDLING PLANT AT MANCHESTER.

I now come to what I consider was the turning point with regard to my own experience of what form a coke plant should take to give satisfaction, both to the designer and to the gas engineer. In doing so, I find that we are coming back to the original method of coke handling—that is, the man with the barrow. This method, I venture to say, has not been improved upon as far as the manufacture of breeze due to the handling of the coke is concerned, only now we are doing the same mechanically. Rather more than two years ago, Mr. Hill, of the Bradford Road Gas-Works, Manchester, had under consideration the question of handling the coke from twenty-six beds of tens, which were to take large charges.

Their method of handling the coke in the adjoining house is to deliver it through sheets in the stage floor into side-tip wagons on the ground floor level. The wagons are drawn out in trains of five or six by horses to the screening plant; and I believe Mr. Hill would have taken the coke out of the other house in this manner, rather than put in conveyors, with their attendant troubles and cost of upkeep. He was not at all enamoured of the various types of coke-handling machinery then in vogue. A method which was tried at the Liverpool Gas-Works, of pushing the coke out of the retort into a closed chamber and transporting it to the coke yard, seemed to Mr. Hill to be getting nearer to a possible solution of the problem. He did not see why the coke should not be transferred from the retort to the yard in a direct line, instead of being carried in front of the other beds and out at the end of the house, and, as is sometimes the case, brought back again outside the house to a point pretty well opposite to the retort from which it had been discharged.

There are many other reasons in favour of going straight out, which will no doubt be patent to every one of you. I will content myself with citing the instance when other beds are down for repairs, and the steam and smoke from the partially quenched coke, as it passes, fills the arches and makes it practically impossible for the retort setters to work while a draw is in progress, which means another source of loss in wages and time in getting the beds re-set or repaired. This appeared to be a very simple and direct method; and I wondered it had not been thought of before, as in the man with the barrow method, we always try to curtail the wheeling distance as much as possible, by arranging for a lot of openings in the side wall of the retort-house.

But to proceed, we at once set to work to try and design a plant which would conform to Mr. Hill's suggestions; and the first idea was to transfer the hot coke, by means of a short travelling conveyor, to telpher skips or wagons standing outside the retort-house, in which the coke would be quenched, and then carried away to its destination. We saw at once that this was not the idea, as there was still a conveyor, and also the method of quenching left a lot to be desired. Next we struck the idea of the skip hoist, which we proceeded to adapt to our conditions, and later we thought of a method in vogue on coke-oven plants, of pushing, the coke out of the ovens on to an inclined floor or bench, where it is then slaked. On our incorporating the two, we saw at once that we had arrived at a very simple idea, and, as far as we could see at that stage, a plant which would be free from the usual troubles which had been inseparable from coke-handling plant in general. Mr. Hill was afraid the skip would soon be destroyed by the heat, so two spare skips were supplied. After two years' working, however, the new skips, which have been out in the yard, have suffered more than the one on the machine which has been continually at work handling the hot coke.

I would like here to give a little incident with regard to coke quenching. I was visiting a small gas-works, and was standing in the retort-house with the engineer, watching the men take out the coke in barrows. I noticed that, although they had a quenching tank at the door of the house, they wheeled the coke direct to the yard, where they tipped it, and then slaked it by means of buckets of water from a bosh close by. I asked the engineer if the quenching apparatus was out of order, and he replied: "Oh, no; but it costs us ten times as much for barrows when we use it, as well as a lot more water."

But to return to the Manchester plant. As a Fiddes-Aldridge machine was being installed, for which the makers claim one retort discharged and charged per minute, it was up to us to take the coke at this speed; and the actual time was, from commencing to push the coke out of the retort to delivering it on to the coke-bench, 35 seconds; skip descending and machine travelling simultaneously to next retort, 10 seconds—leaving a margin of 15 seconds with the coke plant. The hot coke being removed out of the house so expeditiously, and water and steam eliminated, the conditions are an acceptable change from the ordinary state of things on the coke side of a retort-bench. There is also practically no smoke or grit flying about, which promises long life to the working parts. The conditions outside are also improved, as the slaking of the coke is a comparatively simple matter, on account of the coke lying in an even layer on the bench; while in the spraying most of the dirt is carried away with the water, leaving a nice clean coke.

HUDDERSFIELD PLANT.

The second transporter plant for the removal of the hot coke from the retort-house was installed at Huddersfield. Here, again, the original idea was supplied by the gas engineer, Mr. Singleton, and worked out in co-operation with the contractors. The first drawing shows the plant as originally installed, which consisted of a large tray conveyor in front of the bench, delivering coke through a special type of filler into a gravity bucket conveyor running out to the coke yard at right angles to the beds, and delivering through coke breakers and shaking screens into a large storage hopper, or to band conveyors for stacking in the yard.

The plant worked very satisfactorily as far as handling the coke

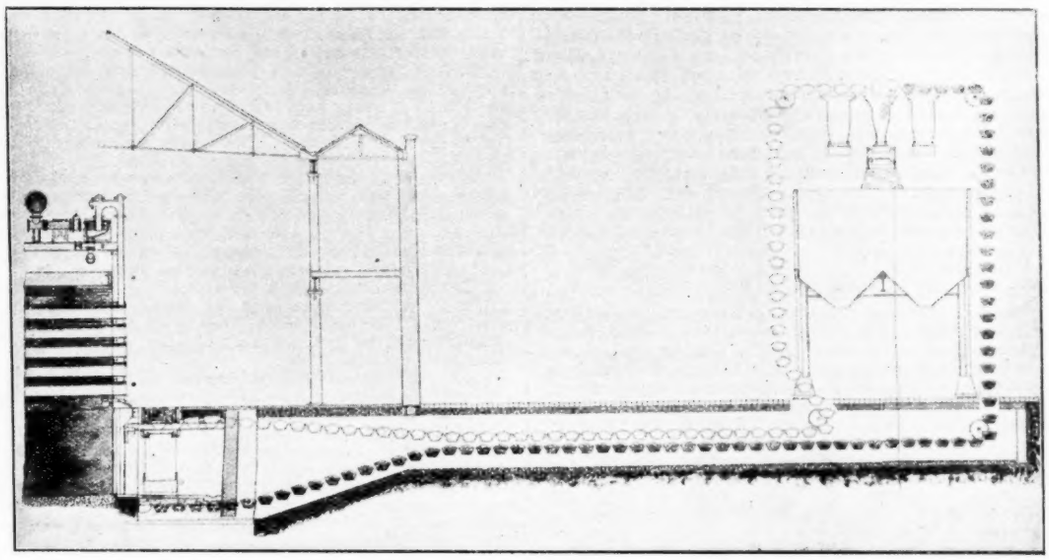


FIG. 1.—THE HUDDERSFIELD COKE-HANDLING PLANT.

was concerned; but the quenching of the coke before it reached the hoppers and conveyor belts was a problem. We had a 4-in. diameter water supply pipe feeding water through efficient sprinklers on the tray conveyor, and further sprinklers on the gravity bucket conveyor. Still the large lumps got through burning in the centre, and set-up fires in the hopper. We had also to have a continuous stream of water on the conveyor bands. This large quantity of water washed a lot of grit into the working parts of the conveyors, causing excessive wear and constant anxiety on account of the fear of breakdowns, which, although few, as the plant was well watched, generally managed to happen at week-ends when the mechanics were away. The engineer, Mr. Singleton, suggested taking out the tray, which was the worst offender, and substituting a skip, which would run in the conveyor trough and deliver the coke into a hopper, where it could be quenched, and afterwards fed on to the gravity bucket conveyor. On going further into the matter, however, it was decided to do more than this, by installing an inclined transporter, which would receive the coke from the horizontal skip, and deliver on to an inclined quenching bench, so that water and steam would be eliminated from the retort-house, and more time could be taken over the quenching.

The tray conveyor chain, driving gear and motor, return track, &c., under the floor were taken out; the sprocket wheel at the tension end was replaced by a large rope pulley; a portion of the gravity bucket conveyor was dispensed with; and the filler moved to the position shown in the second drawing. A strongly made skip is arranged to run in the conveyor trough, and is drawn backwards and forwards along the front of the bench by means of a wire rope, actuated by a simple winch gear placed at one end of the plant. The rope is kept taut by the existing tension weights, and supported underneath the floor by suitable rollers.

The skip in front of the bench, which we call the horizontal skip, receives the coke from a retort, and is then travelled to the end of the bench, where the bottom door is released, and is held open by a catch until all the coke has been discharged into the inclined skip. The man then starts the inclined skip on its upward journey; and as it tips and stops automatically at the top, he can devote all his attention to the horizontal skip, on which he releases the catch which allows the door to close automatically, then travels the skip to the retort which will be discharged next. In the meantime, hearing the inclined skip discharge its load on to the coke bench, he reverses his controller, and this skip returns to the foot of the incline, where it stops automatically, ready to receive the next load. The plant is worked from a central control station, near the point of delivery of the coke from the horizontal skip, so that the man can operate the catch on it. He also has an unobstructed view of the retort-bench, and is able to travel the horizontal skip to any desired position.

The inclined skip gently discharges the hot coke on to the coke-bench, where it is then quenched. It was not possible to instal a bench large enough to hold the coke from a complete draw, so the bench as installed will hold one-half—that is, over 5 tons of coke. The time taken to bring the coke from the furthest retort to its being discharged on to the bench is two minutes, and to convey one-half of the draw, twenty minutes. So that the first skipful of coke is on the bench cooling for nearly twenty minutes, and the remainder a similar length of time. When the bench is full, the conveying plant is started, and works at its full capacity as long as there is coke on the bench, and is stopped as soon as the conveyor has emptied itself. The plant never runs empty.

Owing to the difficulty in getting materials, it was not possible to make the change until last February, when all the beds were at work, and we had to have a very large staff of men to wheel the coke into the yard, as it required three large barrows to hold the coke from each retort. As there are nine beds of "tens," this meant 54 barrow loads of coke to every draw, or 540 every twenty-four hours.

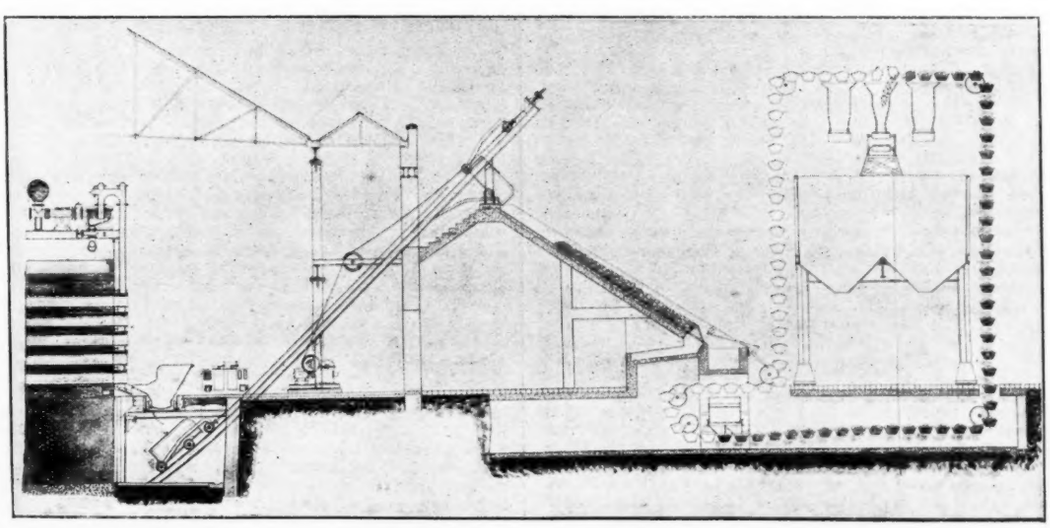


FIG. 2.—THE HUDDERSFIELD COKE-HANDLING PLANT.

The beds are worked ordinarily in two eight-hour shifts—from 6 a.m. to 2 p.m. and 6 p.m. to 2 a.m.; but we had to work twelve-hour shifts continuously while changing-over, on account of the delay in getting the coke away. The work of changing-over was commenced at 2 a.m. on a Tuesday morning, and the plant started to work in the new form at 3 a.m. the following Sunday, and has given perfect satisfaction and freedom from worry ever since. The only new parts required up to now have been two new ropes for the inclined skip, which had suffered much from the quenching fumes and the weather.

Not the least satisfactory thing about the plant is the favourable way the stokers have received it. This means a lot towards successful running.

DISCUSSION.

Mr. H. FLETCHER (Garston), Junior Vice-President, who was in the chair, said he would like to ask Mr. Woodhead what the coke bench was made of—was it plated or concrete? The late Mr. Edward Allen and the present Engineer of the Liverpool Gas Company (Mr. R. E. Gibson) brought out a patent for the cooling of coke without the use of water. It had, however, not quite solved the problem; the time seemed excessive. The coke produced was a beautiful, hard dry coke, and free from breeze. Mr. Astbury, the Assistant Engineer of the Liverpool Gas Company, had introduced a system of quenching coke handled by the telpher system. In his patent, the skip was lowered into a shallow tank of water about 6 in. deep. The doors of the skip were closed-down, and the steam from the hot coke was supposed to quench the coke.

Mr. A. L. HOLTON (Manchester) said that Mr. Woodhead had brought to their notice one of the methods of coke-handling which could claim many advantages, and should command the careful consideration of all who are faced with this problem. In the early part of his paper, the author called attention to the advantages to be derived from a closer co-operation between the gas engineer and the contractor; and they had an example, in the hot-coke transporter described, of the successful issue of such mutual working. The late chief of the Manchester Corporation gas undertaking (Mr. J. G. Newbigging) was a firm believer in co-operative working; and all problems were considered by him with his staff from all aspects, receiving in their final form his well-balanced judgment. Mr. Woodhead evidently spoke with only partial knowledge of the facts so far as Bradford Road was concerned; for the idea of an outside coke bank was the parent of the whole scheme. The method of removing the coke from the retort-house in question was a matter of anxious thought with their late chief, as he was not particularly enamoured of either the conveyor or the telpher system. The coke-bank system as used at coke-ovens was taken into consideration first, as the house lent itself somewhat to this method. The moving of the coke from the front of the oven to the bank was the next step for consideration; and several methods were considered before the plan proposed by Messrs. Drakes was finally approved. The care exercised in preparing the design of the original hot-coke transporter was reflected in the fact that very few alterations were required—and those only of a minor nature—on a second transporter ordered after considerable experience with the original one. One of the suggestions was to push the hot coke into a chamber of similar size to the retort, and then, by tilting the chamber, shoot the whole contents on to the coke bank. Of course, he could not speak as to Mr. Hill's preference for the tip-wagon system, as compared with the conveyor; but he hardly thought the author was right in his statement. He was most certainly wrong in stating that Mr. Hill was afraid the skip on the transporter would be quickly destroyed. It was due to the constant preaching of disaster by others that spare skips were ordered as a special precaution. The time taken for dealing with each skip full of coke at Manchester was a little more than the author stated, for there was also a movement of the machine along the house to allow for the closing of the retort-lid. The quenching of coke was a problem under all systems; and it would be instructive to have tabulated comparative data of various methods of slaking. The breaking up of the coke into breeze size was to be avoided as far as possible. In the slaking of the coke on the bank, their practice pointed to an increased efficiency when using water at high pressure—the water thereby penetrating into the interstices of the coke. But, even under bank conditions, when the cold water met the incandescent coke minute explosions took place, causing disintegration.

Mr. ALSOP (Bolton) remarked that the amount of breeze likely to be made was always considered when dealing with coke-handling plant. Now that the cost of coal was so great, it appeared that they must go forward to the stack, where great quantities of breeze were made by reason of the weather and stacking in the open. So that, if one wished to reduce the net cost of coal, it would appear to point to the policy of quick sales, no stacks, and the consumer making his own arrangements for storage. Inaccessibility was a great factor, and certainly one which did not receive the attention it deserved. The author did well to make a special point of this. He was firmly of opinion that the necessary care and attention were not always given to coke conveyors—they were expected to run without any careful attention. Mr. Woodhead seemed to have overcome the shortcomings which were known to all of them. The suggestions given possessed considerable merit, and were a decided gain on the practice prevailing in horizontal and inclined retort-houses. Vertical retort-house plants did not deal with hot coke. He thought, however, that improvement could be made where coke was dealt with by an underground conveyor. He could not agree with the author's suggestion that contractors should take the responsibility of maintenance; and he did not think they would do so either. Gas-works generally did not seem to realize the importance of this portion of the plant being in charge of a really good man, held responsible for proper cleaning and sweet running. Cheap labour was used; the oiler and greaser slapped on oil and did practically no cleaning. He was quite aware of the fact that dust and dirt were constant. This being so, all the more reason for constant cleaning. The contractor would want some guarantees from them, such as would be more than they were prepared to give. He thought it was their duty to watch the plant more carefully, and put a good man in charge, and then hold him, together with his foreman, fully responsible—in fact, get them to look upon the plant like an engine driver did his engine.

Mr. J. M'NICHOLL (Mossley) made reference to coke-handling plant given in his Presidential Address in 1914.* Looking at the drawing, he thought it would have been better to have carried the incline further up, and deliver the coke direct into the hopper and dispense with the gravity bucket conveyor. The telpher system was good; and he liked the elevated stage at the end of the house.

Mr. H. STONE (Birkenhead) said that coke-conveyors were always a source of trouble. He wondered where Mr. Alsop's perfect man was to be obtained? Good men could be got before the war. Even then, although every summer they had their plants overhauled, still the conveyor broke down. In regard to the verticals installed at Birkenhead, he thought the breeze made was not excessive.

Mr. W. HILL (Stalybridge) thought the telpher system was a good one, and very successful on large and medium-sized works, but not for small works like theirs. At his own works they had a telpher. His experience was, few breakdowns or stoppages; and he could thoroughly recommend the telpher system.

Mr. W. H. HEALD (Preston) considered that the coke-conveyor working from vertical retorts had only half the life of the horizontal retort coke-conveyor. Mr. Gibson, of Liverpool, read a paper on conveyors before the Manchester Institution of Gas Engineers. His idea was a coke-conveyor inside the house and a loco. crane outside. The Oldham works dealt with their coke in this way. He thought that a crane having a 60 ft. jib could take the coke and put it into the hoppers, and that this took a lot of beating. He was surprised at the gravity bucket conveyor being retained. He considered it the worst type of conveyor for coke. At Preston they had two screens—a rotary, from which they removed 17 p.ct. of breeze, and the coke left clean, and a Glasgow screen, which removed 13 p.ct., but the coke was not as clean. He would like to know how many men were required to work the Huddersfield plant. He thought it looked like two. He did not think the maintenance of coke plants would be undertaken by the contractors. The Woodall-Duckham Company undertook the maintenance of their installations as far as the retorts went. Mr. Woodhead had mentioned the automatic cut-out. In his opinion, anything automatic was no more safe than the human element, and an electric device far from it.

Mr. HOLTON at this juncture asked how the coke was slacked, as the drawing did not give this information.

Mr. FLETCHER, before calling upon Mr. Woodhead to reply, referred to Mr. Gibson's paper, and how the jib crane could give two peaks, as against one by telpher.

Mr. WOODHEAD then replied briefly to the questions asked. The coke-bench was lined with old quarries from the retort-settings. The bench had lasted twelve months, and to repair it three bricksetters were employed on two afternoons. The alterations had cost them £1000; and when considering this they must remember that, in keeping the tray conveyor in repair, it often meant ten pins and rollers per day, the cost of which ran up to £200 a year. Whereas if the contractors were to maintain the plant, it would have to be simpler, and one upon which they could give a guarantee to maintain. As regards the quenching of coke, they had tried sprays, roses, &c., but found a man standing at the foot of the bench with a hose and spray to answer the best. With respect to the gravity-bucket conveyor, this was there, and little alteration was required beyond shortening. The hoisting skip was practically balanced; so that little power was required to work it—a 7 H.P. motor operated it. It was their intention ultimately to do away with the gravity-bucket conveyor, and introduce a coke crane. Replying to Mr. Heald, two men were employed. He added that he had found the automatic cut-out was very reliable indeed.

Mr. FLETCHER proposed a hearty vote of thanks to the author for his interesting paper, to which Mr. WOODHEAD briefly replied. The proceedings then terminated.

REMARKS BY THE PRESIDENT.

As mentioned, the President (Mr. C. E. Teasdale, of Salford) was prevented by indisposition from being at the meeting. He had intended, had he been present, to have made the following remarks on the paper:

The subject of Mr. Woodhead's paper is of great importance to gas engineers. Any method of coke handling which tends to provide a minimum of wear and tear, working parts, power to drive, coke breakage, attendance, and cost of upkeep, is worthy of every consideration. The above conditions are somewhat "ideal;" but we are gradually working in this direction. There are many money "eating" methods in the market which, with the "efficiency methods" coming along, will have to be gradually scrapped, and plant adopted of greater efficiency. I have seen the wire rope and skip principle at Huddersfield; and it is approaching more the "ideal" conditions. It is worthy of being seen and adopted. All concerned in its design are to be congratulated. The multiplicity of working parts in many designs of coal and coke handling plants necessitates careful watching to prevent breakdowns. The wear and tear, power attendance, cost of upkeep, &c., are all increased. I certainly agree with Mr. Woodhead that many contractors have worked constantly on one design of plant for years, without modification to any extent; whereas the man who is responsible for working the plant is making alterations periodically to keep up its efficiency. The designer does not follow the plant in its practical working, and therefore he does not see the weaknesses of the design as does the engineer in charge. I have often thought it would pay a contractor to employ on his staff an engineer who has had practical management of a gas-works, that he may follow-up the contractor's plant erected in various works, examine it, discuss it with the engineer in charge, suggest latest improvements, &c. Such an engineer could, by his knowledge of gas-works management, be useful in many ways to the firm.

---

* See "JOURNAL," Vol. CXXVI., p. 35.

THE NERRIÈRE COKE-DISCHARGING MACHINE.

A description is given in our French contemporary, the "Journal des Usines à Gaz," of the machine named the Nerrière for mechanically discharging coke from retorts. The machine is intended for use in supplement to a charging machine of the Smulders type, such as is employed in small works. Its essential feature is a pair of hooks joined by a cross-piece and forming, with the latter, an expansible unit which, in its contracted shape, is thrust into the retort (by a pair of horizontal levers) above the coke, then expanded, by means of the levers, so that it practically fills the cross-sectional space of the retort, and is finally withdrawn—pushing the coke before it.

Fig. 1 shows the appliance in side and cross section as it is introduced into the retort. In fig. 3, the jointed system has been expanded, and is ready to be withdrawn. As will be understood, the appliance is adjustable for dealing (within limits) with retorts of lower height, or those which have become much encrusted with graphite, as indicated in fig. 3; while its hinged construction allows of its being used, as shown in fig. 4, in retorts of abnormal shape. It is, however, intended that the appliance should fit snugly into the crown of retort during its forward travel (fig. 1), and should practically fill the space of the retort (fig. 2) when expanded for return. Its size will therefore vary according to that of the retort. The whole appliance is fixed to an overhead travelling platform, such as that customary for a charging machine, and, in dealing with retorts at different levels, is raised and lowered by a winched screw.

The chief advantages which are claimed for the machine are: First, its economy of manual labour of a particularly arduous kind; secondly, a more rapid discharge of the coke, and therefore lesser cooling of the retort; and, thirdly, an improved quality of coke, owing to the smaller proportion of crushing. The time of discharge is found to range, according to the skill of the workman, from 30 to 45 seconds from the moment of introducing the appliance into the retort. Comparisons of the times occupied in discharging a retort from the moment of opening the door to completion of recharging have shown that with the Nerrière discharger the time will vary from 90 to 120 seconds in comparison with from 3 to 5 minutes by manual labour. It is found that a bench of five retorts can be discharged and re-charged within 15 minutes. In its use at the St. Brieuc Gas-Works various qualities of coal have been carbonized without creating any difficulty; the charge per retort being from 180 to 190 kilos, although heavier charges—of from 215 to 220 kilos—have easily been dealt with by discharging the coke in several successive operations of the apparatus.

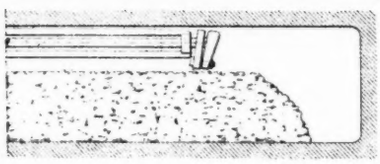
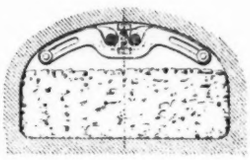


Fig. 1.



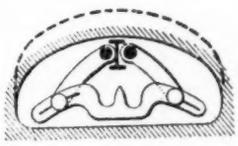


Fig. 3.

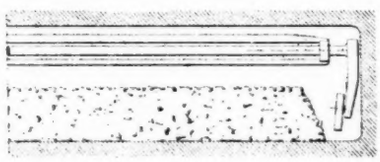
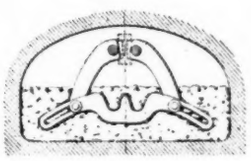


Fig. 2.



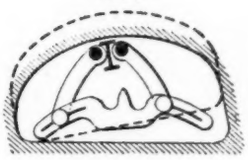


Fig. 4.

THE NERRIÈRE COKE-DISCHARGING MACHINE.

A CURIOUS COKE-HEATED BOILER FAILURE.

In the course of a recently-issued "memorandum" by Mr. Stromeyer, to the Manchester Steam Users' Association, particulars are given of a unique case of external uniform corrosion that occurred to a coke-fired Galloway boiler which supplied steam to a gas-works.

There was not, it is said, the least indication of moisture in the flues or of corrosion due to dampness; and the inside of the boiler was in apparently perfect condition. But while the inspector was sounding the shell plate with a hammer, his suspicion was aroused with regard to the side plates at the back end of the boiler; and after a careful re-examination it was decided to drill the shell plates just below the side flue covering. Originally these plates had been $\frac{7}{16}$ in. thick; but it was now found that they had been reduced to $\frac{3}{32}$ in. at the back end, and to about $\frac{5}{16}$ in. at the forward end—only for a width of about 1 ft. below the side flue coverings. Under the brickwork there was practically no corrosion. It was also noticed that the outside of the shell plates was covered with a pale reddish scale, which, on examination, was found to consist of dehydrated sulphate of iron (green vitriol or copperas) and red oxide of iron.

The Association's chemist then examined the boiler, and found that this sulphate scale extended from just beyond the bridge all over the heating surface of the boiler, except where it was protected by flue dust and ashes. It was thickest at the upper portion of the side flues. The only previous case of this form of wasting of which there was any knowledge was reported in 1888 as having occurred at some Belgian works; but the reported details were too few to be of practical use. It was at first thought that the coke with which these boilers were fired had been slaked with water containing sulphate of ammonia; but it was definitely established that town's water had always been used. Except, therefore, that these boilers were fired with coke, their treatment was the same as that of any other boiler.

A careful inquiry was then made into the question of the production of sulphuric acid and its power of corroding iron. It can hardly be said that it solved the mystery; but its results may prove of future use, and are therefore briefly recorded.

When coke or coal is burnt, the sulphur contained in these fuels is converted into sulphur dioxide (SO_2), which has the well-known smell of burnt sulphur; and this is generally associated with traces of sulphur trioxide (SO_3), also known as sulphuric anhydride, a gas which escapes from fuming sulphuric acid. Dry sulphur dioxide (SO_2) will not attack steel or iron unless heated to near redness, which heating could not possibly have taken place in the flues of the boiler under consideration. There had, however, been a few serious cases of wasting by SO_2, due to the use of machanical stokers, an intensely hot flame, and local accumulations of scale close to the furnace flanges. These parts of the furnace must have become overheated, and were attacked by the sulphur dioxide to such an extent that they finally wore through and leaked. The conditions in the side flues of the present boiler were such that this action could not possibly have taken place; and attention was therefore centred on the sulphur trioxide.

This gas can be produced from sulphur dioxide by mixing it with air and passing the mixture over a catalytic agent—the most common one being moist nitric acid in the lead chambers of sulphuric acid works, or platinum sponge. But red oxide of iron was found to be an almost equally efficient catalytic agent; for by merely dusting the inside of a glass tube with rouge (red oxide) and heating it, a mixture of the dioxide and air was readily converted into trioxide. Seeing that some makers paint their boilers with red oxide before sending them out, it is possible this oxide might effect the conversion; but it is difficult to explain why thousands of other boilers which were also painted red did not suffer like the present one.

Sulphur trioxide, like the dioxide, will not attack cold iron; and it is doubtful whether it will attack it when heated. On the other hand, when the trioxide is mixed with water, the mixture is known as sulphuric acid (oil of vitriol), which will attack iron very energetically if it contains an excess of water. After a careful study of the vapour tension of this acid, the conclusion was arrived at that the corrosion in the boiler had not been active while the boiler was in use, but that sulphur trioxide or perhaps sulphuric acid had been absorbed by the scale on the boiler plates, and then when the boiler was lying idle and was cold, moisture from the atmosphere had been absorbed by the very hygroscopic calcined green vitriol until a fairly dilute sulphuric acid had been formed. This would be prevented from trickling down the sides of the boiler plates, because, being in contact with them, it would attack them and form more green vitriol crystals, which would remain in place. The suggestion therefore is that the elements of sulphuric acid were formed while the boiler was at work, but that the actual corrosion only took place when the boiler was idle.

As already mentioned, cases like the above seem to be extremely rare; but possibly, now that attention has been drawn to this one, similar ones will receive special attention, and a careful watch should be kept on boilers which are burning coke. If similar cases should be discovered and the corrosion checked in time, the space devoted to this one will not, Mr. Stromeyer considers, have been wasted.

CORRESPONDENCE.

[*We are not responsible for opinions expressed by Correspondents.*]

Benzol Supplies from Gas Undertakings.

SIR,—The Automobile Association views with great anxiety the possibility that many gas-works that have during the war been scrubbing their gases for benzol may discontinue this practice.

It will be obvious to all connected with the motor trade, motor transportation, or owning private cars, how important any source of home-produced fuel must be—not only at the present moment, but in the ultimate development of motor traction in this country.

At present, the only source of such production in any considerable quantity is the benzol produced by the gas-works, coke ovens, and tar distilleries; and any reduction such as would follow if the companies in question discontinued scrubbing, would have a disastrous effect.

This Association and the kindred societies who are working with us in this matter—namely, the Royal Automobile Club and the Society of Motor Manufacturers and Traders—go further; and we are strongly of the opinion that even the smallest companies should receive direct Government encouragement to scrub their gases for benzol.

In view of the calorific standard now permissible, I venture to hope for your valuable assistance in endeavouring to secure this expansion of a practice which would be of the greatest help in solving the nation's problem for internal combustion engine fuel.

STENSON COOKE, Secretary,
Automobile Association and Motor Union.

Fanum House, Whitcomb Street, W.C., Feb. 18, 1919.

Gas Investigation Committee.

SIR,—Scientific workers generally will be pleased of the assurance that it is not the intention of this Committee to employ trained men at inadequate salaries. The Institute of Chemistry is aiming at a minimum of £300 a year; and the new British Association of Chemists would do well to adopt this as part of their programme.

With regard to the other points of Prof. Cobb's reply to my letter published in the "JOURNAL" for Feb. 4, I agree that in the event of blue water gas being slightly carburetted 314 B.Th.U. is a likely figure. The original report did not show this; and, as time goes on, the importance of gas composition will become manifest.

Accepting the correction that the specific gravity of ·538 mentioned in my previous letter referred to semi-carburetted water gas, I am still more surprised that the professor maintains this as correct in the presence of 24·6 p.ct. of inerts. Again, I say it is impossible—a little sum in arithmetic will give near enough proof, apart from practical experience.

Then as to "the differences due to the use of weight against volume measurement of the water and the 0°, 4°, 15°, 20°, or 0° to 100° mean calorie" being "of quite a second order," as compared, for instance, with the correction for the pressure at the meter which was applied throughout—this is open to simple proof; and I challenge the statement. In my original letter I gave a figure.

My impression as to the procedure in carrying out the analyses given in the report was evidently wrong, and little more work would be involved in proving the presence or absence of ethane. But these things I mentioned not so much in condemnation of the report as explaining generally the differences obtained between the calorimeter and analysis.

It is now up to me to suggest a rapid and sufficiently accurate method of determining "primary" air. In the first place, a holder of at least 10 c.ft.—such as is used in meter-testing—is wanted, full of air. This is to be accurately counterbalanced over friction-wheels with all appliances for free movement. Attached to the pulley-wheel have a cam arrangement to compensate for the varying heights of the holder out of water. The bell to be protected from draughts, and have attached a graduated rod or scale to give the volume at different heights of the holder. Test the burner in the ordinary way with definite air and gas adjustments. Then have a circular box of as large a size as possible to enclose the air-ports, and having round the circumference a number of connections to the air-holder. There are a number of ways in which this box can be fitted on. Make another test with the air coming from the holder. If the holder is properly balanced, there should be little difference in the result; the large area of bell yielding to the slightest pressure of gas issuing for the burner nipple. In the event of there being a difference, adjust the air supply to give the same result, and read off the air directly from the scale on the holder bell.

I am open to make suggestions on the last clause of the professor's letter.

J. H. FAIRWEATHER.

Chemical Laboratory, Brentford Gas-Works, Feb. 21, 1919.

Temporary Increase of Charges Act, 1918.

SIR,—In view of the advances of wages since this measure was enacted, and the probable further advance this week (and retrospective), also the reduction of hours with the same rate of pay, and the certain further raising of the price of fuel, it seems to be absolutely necessary that an amendment should be made on the above-named Act, which provides for the payment of three-fourths of the standard dividend by statutory companies—this meaning 3 p.ct. or less, while the Government are continuing to borrow money at 5¾ p.ct., and thus making it quite impossible for such companies to raise additional capital, as they are not likely to get par price for their shares and are prohibited from selling them at less. So what is to be done

Debentures might be issued at 5 p.ct.; but this only where borrowing powers are not exhausted. Why, one may ask, issue debentures at 5 p.ct., when shareholders can only get 3 p.ct. or less? It looks as if the gas industry was to be brought to a standstill altogether; and this pretty much because our legislators do not understand the conditions under which statutory companies work. I should think one is safe in saying that, of those members who voted on the Bill, not a tenth (as a maximum) understand what the sliding scale means—much less what is its actual effect in practice.

As showing the absolute unfairness of the present position, let me give a few illustrative figures:

In 1910, when a standard price was fixed—
Shiftmen were paid 5s.; to-day they are paid 10s. 4d.
" worked twelve hours; to-day they work eight hours.
" got no overtime pay; to-day they get time-and-a-half for overtime and Sundays.
Yardmen were paid 3s. 10d.; to-day they are paid 8s. 4d.
Gas-fitters were paid 5s. 3d.; to-day they are paid 10s. 8d.
Coal cost 8s. 6d. per ton; to-day it costs 25s. 6d. per ton.
Bricks cost 42s. 6d. per 1000; to-day they cost 160s. per 1000.

And everything else in same proportions.

On these figures, is it any wonder that dividends, which were never high as "industrials" go, have been reduced by over 2 p.ct? Repairs and extensions have been at an irreducible minimum, and must be overtaken in the near future; and it has not been possible to place any sum whatever to the reserve or insurance fund, and balances carried forward have practically disappeared. Over and above all, income-tax has gone up from 1s. 2d. to 6s. But still we must carry on for the benefit of what I fear is largely an ungrateful public.

It is, therefore, up to the new National Gas Council, which now has some strength behind it, to make an immediate move to have statutory and maximum-price companies put on a fairer and more equitable basis than at present.

If the "worker," by constant claims for more wages, causes increase in price of such a necessary commodity as gas, why should not he be made to pay his share of such increased cost without taking it out of the poor shareholder's pocket? It almost looks as if our Government desired to squeeze the small persons (of whom a great number are gas shareholders) out of existence Many have invested their savings in gas, on the faith that it was approximately a gilt-edged security. But alas!

There is no prospect of wages or materials ever coming again to the prices in vogue when standard prices were fixed. Therefore, there is less or no need for delay in insisting on having matters adjusted.

Why should other industrial concerns be practically guaranteed pre-war profits, *plus* 5 to 20 p.ct. of any excess thereon, while the gas industry (which is quite as necessary as, if not more so than, many others) has its return cut down to a miserable three-fourths—not of its pre-war return, but of its standard dividend, which even at its full is in all conscience low enough?

Is the reason to be found in the fact that we have been too loyal and patriotic and have not shouted out at and badgered the Government sufficiently?. The "workers" threaten or take drastic (great word) steps, and attain their ends; therefore why should not ——— but 'nuff said!

ELL.

Feb. 18, 1919.

P.S.—Under the auction clauses, many statutory companies' shares have been sold at considerable premiums, so that the three-fourths standard dividend may mean to them not three-quarters but actually only about a half. This can easily be proved to be a fact.

Some Arguments against 450 B.Th.U. Gas.

SIR,—Your contributor of the above-named article has all unwittingly provided the answer to your second contributor, "What is Wrong with the Gas Industry?" inasmuch as the industry continues to grasp at the shadow—B.Th.U. per cubic foot, while missing the substance—B.Th.U. per penny.

The industry fosters within itself two conflicting forces, which can never be reconciled, as example:

(1) B.Th.U. can be produced much more cheaply in low-grade gas; hence all the forces of efficiencies tend toward the lowering of the present-day grade or standard.

(2) The consumer buys per cubic foot, and apparently pays the same for low-grade gas as for high-grade gas.

This gives rise to the forces of efficiency within the industry opposing the driving-force of all business—the effort to satisfy patrons.

The first duty of reconstruction, therefore, should if possible be to merge the interest of the consumers (real or apparent) with the interest of efficiency. To accomplish this, it is suggested to abandon sales per cubic foot, and to substitute sales per contained B.Th.U. Thus would the interests of producer and user be identified; the fullest encouragement be given to efficient production and economic use; and our industry finding fairplay, merit would out, efficiencies would accumulate from every corner, the national need would be served as never before, and then (and not till then) will the era of smokeless towns begin, appreciably, to dawn.

Such, in outline is what, in my opinion is wrong, and the way to right that wrong. I commend to those considering this problem, fraught with such tremendous possibilities to the future, the words of our National Bard:

"There is a tide in the affairs of men
Which, taken at the flood, leads on to fortune;
Omitted, all the voyage of their life
Is bound in shallows and in miseries.
On such a full sea are we now afloat;
And we must take the current when it serves,
Or lose our ventures."

Feb. 19, 1919. AD REM.

Halifax Gas Engineer's Salary.

SIR,—The figure £150 quoted in the paragraph on p. 344 of your issue of the 18th inst. is the sum which the Corporation will save yearly over a period of fourteen years. It is only a small amount—hardly worthy of notice—and was merely referred to by me as an illustration of the value of one small invention.

J. H. WADDINGTON,
Chairman of the Gas Committee.

Halifax Corporation Gas-Works, Feb. 19, 1919.

AMMONIA AND TAR PRODUCTS.

CHAS. PAGE & Co., Ltd.

MERCHANTS. 47/51, KING WILLIAM ST., LONDON, E.C. EXPORTERS.

Suppliers of Benzol Washing Oil.

PICKS, WEDGES, HAMMERS, AXES, &c.

FORKS, GRAFTS, SHOVELS, SCOOPS, &c.

Tel. Add.: "YATONIAN."

Tel. Nos.: East 400, 401, & 402.

JOHN YATES & CO., Ld.,

Aston Manor, BIRMINGHAM,

MANUFACTURERS SINCE 1804

ALL BRITISH

VICES, CUTTERS, BUCKETS, BARROWS, SCREENS, &c.

GAS WORKS TOOLS & APPLIANCES of all kinds.

Sam.l Cutler & Sons Ltd.

Engineers and Contractors

Complete plants for the production of

Coal Gas, Water Gas, Hydrogen Gas.

Providence Iron Works, Millwall. London. 59, Victoria Street, Westminster.

WATER GAS PLANT.

ECONOMICAL GAS APPARATUS CONSTRUCTION COMPANY, LIMITED,

36, Victoria Street, London, S.W.

GASHOLDERS

MILBOURNE PATENT ROLLER CARRIAGES. AUTOMATIC LUBRICATION.

PURIFIERS

WITH

MILBOURNE PATENT DUPLEX VALVES, AUTOMATIC COVER FASTENERS, SAFETY DISCHARGE SHOOTS, RUBBER JOINTING. "MILBEL" PATENT PURIFIER GRIDS.

CONDENSERS, SCRUBBERS, AND GAS WORKS PLANT OF EVERY DESCRIPTION.

C. & W. WALKER, LTD., DONNINGTON, NEWPORT—SALOP.

LONDON OFFICE: 110, CANNON STREET, E.C.

COAL TAR AND AMMONIA PRODUCTS.

Benzole, Toluole, Solvent Naphtha, Creosote Oils, Grease Oils, Carbolic Acid, Dark Cresylic Acid, Granulated (Crude) and Sublimed Naphthalene, Beta Naphthol, Anthracene, Refined Tar and Pitch. Sulphate of Ammonia containing a Guaranteed Minimum of 25 per cent. Ammonia.

For Prices apply to the SOUTH METROPOLITAN GAS COMPANY,

Telegraphic Address
Inland: "Metrogas, Peck, London."
Foreign: "Metrogas, London."

709, Old Kent Road, LONDON, S.E. 15.

PARLIAMENTARY INTELLIGENCE.

HOUSE OF LORDS.

Progress of Bills.

Bills presented and read a first time: Brentford Gas Bill, Huddersfield Corporation Gas Bill, Hartlepool Gas and Water Bill, Newark Gas Bill, Pembroke Gas Bill, Sheringham Gas and Water Bill, Stourport Gas Bill, Sunderland Gas Bill.

Bills referred to the Examiners: Hartlepool Gas and Water Bill, Newark Gas Bill, Pembroke Gas Bill, Sheringham Gas and Water Bill, South Shields Gas Bill, Stourport Gas Bill, Sunderland Gas Bill.

Petitions presented against Bills:

Hartlepool Gas and Water Bill: North-Eastern Railway Company.

Huddersfield Corporation Gas Bill: Midland Railway Company, West Riding County Council, London and North-Western and Lancashire and Yorkshire Railway Companies.

Newark Gas Bill: Midland Railway Company, Derbyshire and Nottinghamshire Electric Power Company, Newark Corporation, Nottinghamshire County Council, Great Northern Railway Company.

Pembroke Gas Bill: Pembroke Corporation, Sir T. C. Meyrick, Bart., and Joseph Gibby, Great Western Railway Company.

Sheringham Gas and Water Bill: Midland and Great Northern Railways Joint Committee, Sheringham Urban District Council.

Stockton-on-Tees Corporation Bill: Cleveland and Durham County Electric Power Company, Stockton Rural District Council, North Riding of York County Council, Durham County Council, Tees Conservancy Commissioners, Middlesbrough Corporation, Imperial Tramways Company, Ltd., North-Eastern Railway Company.

Stourport Gas Bill: Droitwich Rural District Council, Great Western Railway Company.

Sunderland Gas Bill: Sunderland Corporation, South Hylton Gas Light and Coke Company, Ltd., Durham County Council.

HOUSE OF COMMONS.

Progress of Bills.

The suspended Brentford Gas Bill and the South Shields Gas Bill were read the third time, and passed.

The following Bills were read a second time, and referred to the Examiners: Bournemouth Gas and Water Bill, Northampton Gas Bill.

The Stocksbridge Gas Bill was read a second time and committed.

Electric Power Supply Proposals.

Mr. ROSE asked the President of the Board of Trade whether he could state the date on which the Government proposals for the establishment of national super-power stations for the generation of electricity would be placed before the House; whether in the formulation of the proposals, the objection of the municipalities and others to anything like capitalist ownership of these super-power stations would be borne in mind; and whether consideration would also be given to the need for their protection against combinations to keep up the price of coal.

Mr. BRIDGEMAN, in reply, said he hoped that it would be possible to introduce a Bill dealing with the reorganization of electric power supply at an early date. Full consideration was being given to the question of ownership; but he did not think that provisions relating to the price of coal could be included in such a measure.

Summer Time.

Mr. GILBERT asked the Home Secretary whether it was the intention of the Government to renew the Order as regards Summer Time for this year.

Mr. SHORTT, in reply, said he proposed to advise that an Order in Council should be made applying the Summer Time Act this year. The duration of the period was under consideration.

The Gas-Mantle Industry.

Lieut.-Colonel Sir J. NORTON-GRIFFITHS asked the President of the Board of Trade whether legislation was to be introduced to protect the incandescent mantle industry and its raw materials; and whether, in the interests of the mantle industry, he would take the necessary steps to co-operate with the Indian Government in securing for British firms the manufacture of thorium nitrate from monazite sand.

Mr. W. C. BRIDGEMAN (Parliamentary Secretary to the Board of Trade), who replied, said that the question of the precise steps to be taken in respect of the particular industries referred to was part of the general question of the policy to be adopted in respect of industries of special importance, which was receiving the close attention of the Government. The President of the Board of Trade would be glad to co-operate with the Government of India in any measures which might be practicable to secure that adequate supplies from the monazite sand deposits of India are secured to British manufacturers.

Sir J. REES asked if it was not the case that the Government of India had arranged for British control of all the monazite deposits in India which are in the native States.

Mr. BRIDGEMAN: I must ask for notice of that.

Coal Output per Miner.

Sir F. HALL asked the President of the Board of Trade if he could state what was the average yearly output of coal per miner in this country in 1914 and the average wages cost per ton per man, and the corresponding figures for the year 1918; and if he would give similar information for the United States of America.

Mr. BRIDGEMAN, who replied, said he proposed to publish with the official report a statement giving such of the information desired as was available.

The statement referred to is as follows:

The average yearly output of coal per person employed in the coal mines in the United Kingdom was:

Year 1914	252 tons.
Year 1918	236 tons.

The average wages cost per ton of coal raised was:

Year 1914	6s. 2·92d.
Six months to June 30, 1918	12s. 1·95d.

As from June 30, 1918, an additional war wage of 1s. 6d. per day to all persons of 16 years and over, and 9d. per day to those under 16 years of age was granted. The coal costs per ton for the last six months of 1916 were not yet available. No information as to wages costs per ton for the United States of America was available in this country. The average output of coal per man per year is given in a publication issued by the Washington Government Printing Office, entitled "Coal in 1916."

LEGAL INTELLIGENCE.

Claim against the Ipswich Gas Company.

At the Newcastle County Court, on the 14th inst., the Admiralty Commissioners, as owners of the steamship "Vianna," claimed £169 15s. 6d. damages from the Ipswich Gas Company, alleging that in consequence of the negligence or unskilfulness of the Company's servants in handling a hydraulic crane at their premises, at Ipswich, on May 16, 1917, the mast of the "Vianna" was broken. The defendants denied that the breaking of the mast was due to negligence, and said that the plaintiffs had already accepted the sum of £20 in settlement of their claim. The plaintiffs were represented by Mr. E. Meynell, who said the "Vianna" was an interned vessel, managed by the Admiralty. In May, 1917, the vessel was let by charter to the Ipswich Gas Company; and the allegation was that the defendants' servants were negligent when discharging coal from the vessel on to their premises. The suggestion was that the driver of the crane working at the after hold put on too much power, with the result that the jib of the crane over-swung the hold, and either the jib or the grab attached to it struck against the vessel's mainmast and smashed off 6 feet from the top. The "Vianna" was afterwards torpedoed; and the second engineer, who witnessed the occurrence, was lost. A rough estimate was made of the damage by some one who had not seen it; and a claim of £20 was made by letter against the defendants. There was afterwards a survey; and the plaintiffs' representative put down the damage at £150. Defendants sent a cheque for £20 to the agent of the plaintiffs, who knew nothing of the survey; and, in the circumstances, it was submitted that he was not authorized to accept the cheque as a settlement of the claim. For the Company, Mr. Mundahl stated that the defendants' position was that the broken mast might have been spliced at a cost of probably £30 or £40. Instead of doing that, plaintiffs put in a new mast. His Honour said it seemed to him that the plaintiffs had made a certain offer; and this offer had not been withdrawn. The defendants had closed with the offer, and had paid £20 in satisfaction of the claim. He could not say that the defendants had taken unfair advantage of the plaintiffs, because there was no evidence to show that they knew of the conclusions arrived at by the plaintiffs' surveyors. On that point, therefore, he must give judgment for the defendants with costs.

Borrowing Powers at Ashbourne.

Particulars have been supplied to the Local Government Board of the growth of the Ashbourne (Derbyshire) gas undertaking, in connection with an application to borrow from time to time £16,000 for extensions and improvements, and also for the substitution for the existing illuminating power standard of a calorific standard. The Ashbourne Gas Company was established in 1840, and was registered as a joint-stock company from 1862 to 1883. In 1898 a scheme for the reconstruction of the plant was entered upon and gradually carried through; the output at that time being 16 million c.ft. per annum. By means of this reconstruction scheme, a plant capable of turning out 30 million c.ft. of gas a year was installed. The Ashbourne Urban District Council purchased the concern in 1914, at a total cost of £49,002; and so far it had not proved profitable to the Council, there having been annual losses totalling £3670, which had been met out of the general district rate. During the present year it was estimated there would be a deficiency of £700. The losses were due to the abnormal conditions existing since the outbreak of the war, and to the large amount the Council had had to pay for the undertaking. The sales of gas had considerably increased from year to year, to 37,133,000 c.ft. last year. With the alterations and improvements proposed, which included the erection of a new gasholder with a capacity of 200,000 c.ft., the prospects of the undertaking for the future would be brighter. During the war the price of gas had been increased from 2s. 11d. to 4s. 7d. per 1000 c.ft.

Blyth Gas Company.—In their annual report, the Directors announce that the revenue for the year ended Dec. 31 was £30,269 and the expenditure £25,913, leaving a balance of £4355 as the profit for the year. The sum standing to the credit of the profit and loss account is £3887, out of which the Directors recommend the payment of a dividend for the past half year on the ordinary stock at the rate of 2½ p.ct. (less income-tax). This will absorb £1800, leaving a balance of £2087 to the credit of the profit and loss account. The interim dividend for the first half year being at the rate of 3 p.ct., makes the dividend for the year 5½ p.ct. (less income-tax); this being the maximum allowed by statutory powers. The revenue account shows an increase in receipts, when compared with the previous year, of £2576, and an increase in the expenditure of £2217. Coal, materials, and labour have considerably increased in cost. The Glover-West vertical retort installation has been in operation since April last year, with satisfactory results.

MISCELLANEOUS NEWS.

SOUTH SUBURBAN GAS COMPANY.

The Half-Yearly General Meeting of the proprietors was held last Friday, at the Cannon Street Hotel, E.C., Mr. CHARLES HUNT in the chair.

The SECRETARY (Mr. Wilfrid Wastell) read the notice convening the meeting: and the Directors' report and the accounts were taken as read.

A REDUCTION AND ITS CAUSE.

The CHAIRMAN, in moving the adoption of the report and accounts, said: We have a proud satisfaction in being able to meet once more in freedom from the menace of a cruel war. The near prospect of a satisfactory peace brings gladness to every one of us; while to the managing staff of the Company—of every grade—there is the added relief from exceptionally exacting conditions, long and resolutely borne. The first matter mentioned in the report is the reduction of 3d. per 1000 c.ft., which we had the satisfaction of announcing towards the close of last year, and which was hailed in some quarters as though it presaged a general return to lower prices. Unfortunately, this was not the case; on the contrary, it is already uncertain whether, owing to fresh demands from miners and others, it can be maintained. Now, however, that we are free to speak, it is as well to explain how this reduction became possible. For some time previous to the war, the Company had been supplying gas for manufacturing purposes under a contract advantageous enough under normal conditions. It was, however, quite impossible for anyone to foresee the outbreak of war with its enormous demand for munitions, and the consequent increase of this particular consumption to something like fourteen or fifteen times the original amount. And I venture to think that it speaks well for the resources of the undertaking, and also for the management, that year after year huge increases of this particular consumption at the extremity of the Company's district, and remote from any manufacturing works, were met without failure of any kind. It is but right that I should mention in connection with this supply those of the Company's officials who, under the Engineer (Mr. S. Y. Shoubridge), were more directly responsible for its maintenance. They are, Mr. Judd, the Superintendent of the Bromley Works, Mr. Gosling, at Cray, and Mr. Jeffrey, at Crayford, all of whom gave unremitting attention to it, and had very anxious times in connection with it. Unfortunately, manufacturing costs also greatly increased; and although somewhat early in the period these were satisfactorily met, during the last year or so, the position became serious. Representations were accordingly made with regard to them; and eventually a fresh settlement was arrived at by the efforts mainly of our excellent Secretary, Mr. Wastell, the benefit of which was immediately given to consumers.

CO-PARTNERSHIP AND A DEVELOPMENT.

In the order of its importance, I venture to think that the subject of co-partnership stands second to none at the present time; and I make no apology for referring at once to the recent development of this system as affecting this Company's operations, particulars of which have already been sent to every proprietor. It is needless to say that this development is the result of very careful consideration on the part of all concerned—Directors, as well as co-partners. It had its origin in what are known as the Whitley reports, which, when first published, were hailed by many—myself among the number—as a step towards co-partnership; and they are certainly in advance of anything short of co-partnership that had previously been attempted with the object of promoting conciliation between employers and employees. Great, therefore, was the surprise on finding that in later reports co-partnership is treated as of little or no account in the matter. The whole of the reports, however, were referred to the Company's co-partners; and their opinion was invited as to whether or not they were likely to form the basis of a satisfactory working arrangement. In the result, a Committee of Co-partners, meeting entirely by themselves, came to certain conclusions, which are all embodied in the report which is in your hands, and therefore it is not necessary for me to quote the whole of them. The first resolution passed by this Committee reads as follows:

> **While recognizing in the recommendations of the Whitley Committee a great advance in existing methods of settling general conditions, adjusting points of difference, and thus avoiding disputes, we desire to express our extreme regret that the Committee refrained from making any recommendations with regard to co-partnership undertakings, and also that the Ministry of Labour, in compiling particulars of existing forms of Works Committees, failed to publish evidence which must have been available to them, of the work of Co-partnership Committees of the gas industry, in harmonizing relations between employers and employees.**

This resolution was followed by another, which reads thus:

> **We are of opinion that our Co-Partnership Committee can be adapted to carry out the functions of Works Committees more harmoniously and conveniently than any other form of Committee which excludes the special relations existing in co-partnership.**

Then follow other resolutions which mainly concern the machinery by which the co-partnership system is brought into operation—viz., by appointing the elected members of the Co-Partnership Committee (composed of members nominated by the Directors, and an equal number elected by the employees), a Committee to whom are referred all grievances or disputes which cannot be settled with the management—the decisions of such Committee being subject to the approval of the Co-Partnership Committee as a whole. These resolutions, together with the others which appear in the report, were approved by a general meeting of co-partners at Lower Sydenham, which the Directors attended, over which I had the good fortune to preside, and following which this final resolution was unanimously adopted:

> **This meeting of employee co-partners hereby agrees to accept the Co-Partnership Committee as a Works Committee for the purpose of adjusting any matter affecting our interests as employees, in preference to any other form of Committee, and pledges itself to adopt no other means for the settlement of any matter at issue until the whole machinery of our co-partnership system has been utilized without satisfactory result.**

Similar meetings were afterwards held at Bromley, and at Cray, with the same result. This, in brief, is the scheme which has now been in practical operation for several months with complete satisfaction to all concerned. In addition, the assistance of the Co-Partnership Committee has been enlisted for improving, so far as it may be practicable to do so, the conditions of employment, both physically and also as regards the general welfare of the employees. It is believed that in so doing we are building upon the sure foundation bequeathed to us by Sir George Livesey, and are adapting the superstructure to the requirements of to-day, as he would have done had he remained with us.

A SUGGESTION FOR NON-CO-PARTNER TRADE UNIONISTS.

Proprietors who are readers of the "Nineteenth Century Magazine" may have noticed in this month's issue an article on "Co-Partnership," over a signature well known to many in this room—Mr. C. J. Carter. I mention it because of it having elicited from the "Westminster Gazette" reviewer a remark which is not without significance at the present time. The reviewer says that the author of the paper "does not seem to know how formidable is the opposition of organized labour to the adoption of any such scheme," meaning, of course, co-partnership. If this be true—if there be really this opposition to co-partnership on the part of organized labour—it is surely desirable in the interests of all concerned that the grounds of such opposition should be made public. I venture, therefore, to suggest to the Editor of the "Nineteenth Century Magazine" the desirability of his enlisting the help of some representative trade unionist for this purpose. Nothing can be lost by a public discussion of the subject; on the contrary, much may be thereby gained. And I may be allowed to put the following questions for the consideration of organized labour. What better means than co-partnership—with its freedom of discussion on work and wages, its voice in the conditions of employment and in the management, and its co-proprietorship—can be devised for furthering the demand that workmen shall henceforth be something more than (to use the figurative language of one of the labour leaders) "hewers of wood and drawers of water?" In what respect does co-partnership inadequately represent, or fall short of, the present aspirations of labour for the betterment of humanity?

A MEMORIAL.

I should like to refer here to the co-operation of the Company's co-partners in the erection of a memorial in recognition of the part taken by 459 of the Company's employees in the great war, now happily ended. Some of these employees have already been gladly welcomed back. To the dependants of those (54 in number) who will unfortunately never return, we, on behalf of all, respectfully tender our most heartfelt sympathy. To those of the other sex of all grades who so ably came to the assistance of the Company when such assistance was very sorely needed, we record our very grateful thanks, which are intended to be supplemented by a slight memento of the time which they will have spent on the works of the Company, "doing their bit," most usefully, albeit unobtrusively. It should be mentioned that of the foregoing employees 69 were wounded, and nine gained distinction. Also, that the united contributions of employees, Directors and Company, to the fund for dependents, have amounted, since its inception, to upwards of £16,000, nearly the whole of which has been distributed.

THE RATIONING ORDER AND THE RESULTS.

The latest Fuel and Lighting Rationing Order, to which reference was made at our last general meeting, has fully justified what was then said of it. It has inflicted considerable hardship upon a comparatively small number of consumers who had pinned their faith to gas heating; the bulk of the consumers having been left practically untouched. Nor is it possible to imagine it as productive of results at all commensurate with the labour and expense it has involved. For the first three months of its operation, the total consumption of this Company's ordinary consumers shows a reduction of 25 p.ct., as compared with that for the corresponding quarter of 1917, while that by penny-in-the-slot consumers, similarly compared, actually increased by 1·20 p.ct., the shilling-in-the-slot consumers showing a reduction of only 6·37 p.ct. That these returns were not affected to any extent by new business is apparent from the increase of only about ¾ p.ct. in the number of additional meters fixed throughout the year. In certain typical districts, representing roughly large, medium, and small sized houses, the reductions varied from 44 to 14 p.ct.—the largest reductions practically corresponding with the greatest number of the larger houses. It was quite to be expected that the occupants of such houses should make sure of a moderate supply of solid fuel, even at the expense of their gas rations, having regard to which, and to the admitted necessity for conserving the fuel resources of the nation, it is at least unfortunate that the Government did not take into account the economy effected by carbonizing the coal instead of consuming it in the raw state, and encourage, rather than discourage, gas heating in households.

THE DARTFORD TRANSFER AND THE PROJECTED WORKS AT BELVEDERE.

As mentioned in the report, the Company's Bill of last session became law towards the end of the year; and the transfer of the Dartford undertaking has since been effected. This increases the area of the Company's district of supply by 42 square miles, or to 143, as compared with its original area of 14·57 square miles. It is quite believed that this additional area is capable of further development, which cannot but inure to the advantage of the undertaking as a whole. As you are aware, the Dartford works are already fully taxed; and the position at Lower Sydenham and Bromley being very similar, attention is naturally being directed once more to the advisability of making a commencement with the new works at Belve-

dere, which have been in contemplation for a considerable time. Already a connection with the railway has been made; but the next step will depend to a great extent upon the cost of labour and materials, which at the present time offers no inducement to expenditure beyond what may be absolutely necessary, besides which it is as yet impossible to raise additional capital, except upon special terms.

THE ACCOUNTS EXAMINED.

The expenditure column of the revenue account shows only three items which in any degree reflect the falling off of 12·26 p.ct. in the gas consumption; these items being coal, oil, &c., which is less by £2677; stoves, &c., by £4847; and fittings, by £285, as compared with the corresponding half of 1917—all others, similarly compared, showing more or less substantial advances. It is seen from this that the growth of expenditure still continues; and there is certainly no present indication of any speedy reduction. It may be mentioned that the cost of wages has advanced since 1914 from 9·51d. to 17·43d., or 7·92d. per 1000 c.ft. sold; and that, as compared with 1913, coal, less residuals, is costing more than two-and-a-half times as much. In fact, these two items alone account for nearly the whole of the present charge for gas above pre-war rates; the extra cost of all other materials more than making up the difference. The one satisfactory feature in the accounts is the substantial increase in the amount to be carried forward—viz., to £21,972, or something like the equivalent of a half-year's dividend at the present greatly diminished rate. This carry-forward is, as may be supposed, attributable to the satisfactory settlement already referred to; and although referable in part to the previous half year, fully justifies the reduction of price to consumers.

THE DIVIDEND LIMITATION.

The dividend to which the Company are entitled under the Statutory Undertakings (Temporary Increase of Charges) Act is £3 15s. p.ct., or 5s. more than the dividend paid last half year. But for this Act, the dividend could only have been at the rate of 2 p.ct.—this corresponding, under the sliding-scale, to the price of 4s. 3d. charged for gas in the last quarter of the year. Our thanks are therefore due for this relief; and particularly for the sympathetic ear which Parliament lent to the financial hardships of gas undertakings under present conditions. This encourages the hope that substantial justice will be done to our claims in the post-war settlement which has been practically promised by the President of the Board of Trade. Nothing has, however, yet transpired as to his intentions in this respect, nor when they are likely to materialize. In the meantime, of course, it is quite impossible to regard with complacency the limitation of dividend to three-fourths of that which would have been payable had the Company remained with a maximum price. As an inducement to economy, the sliding-scale has in many cases ceased for the time being to exist; and how it can be restored to the position it formerly occupied in this respect is naturally occupying a great deal of attention. As at present advised, it seems to us that where—as in the case of this Company—relief under the Act has had to be sought, substantial increases of standard or maximum prices are inevitable if the stability of the undertakings is to be maintained. Such increases would naturally involve other considerations, such as the permanence or otherwise of the present cost of manufacture and the high value of money. These will doubtless have to be met. Anyhow, it is to be hoped that all concerned may be practically unanimous as to the best way of dealing with the matter, and that there may be united action with regard to it. One advantage to be gained by raising standard prices would be that the scales of bonus to co-partners might be adjusted accordingly.

THE QUALITY OF GAS.

Intimately connected with this subject is that of the standard quality of gas. It will be remembered that some time ago the Directors unsuccessfully applied to the Board of Trade to extend the Company's 475 B.Th.U. standard, now in operation throughout about three-fourths of the district of supply, to the remaining one-fourth. Since then, although what may be called the official standard has remained at 500 B.Th.U., opinion has been forming in favour of a still lower standard than 475, largely influenced by certain economical results obtained by steaming during the process of carbonizing in both horizontal and vertical retorts, and also by the advantage derived from using a proportion of blue water gas. It is understood that the Board of Trade have under consideration this and other matters in connection with gas supply, and that a report on the subject may shortly be expected. Meanwhile, an open mind is being kept with regard to it; our desire being to supply such gas as experience may prove to be suitable to the requirements of the customers of the Company. It is, however, permissible to hope that regard will be had to the manifest advantage of distributing coke in the form of combustible gas, and to the equally manifest advantage from a national point of view of extracting benzol from the gas, if this can be done without prejudice to the consumer. It is all a matter of £ s. d.—the consumer being entitled to the gas for which he pays. It really needs, however, but little stretch of the imagination to picture the gas of the future—possibly of the near future—as being completely deprived of its illuminating constituents; and therefore capable of being stored by compression without injury to its quality, with other attendant possibilities. Is it possible that Lord Moulton had in mind this very subject, when he recently advised the gas industry never again to be content to submit to the cramping conditions of the past?

GOVERNMENT ELECTRICITY PLANS.

One other matter requires to be mentioned very briefly. It is understood that the Government are about to make some very important proposals as to the supply of electricity, which look very much like State aiding a rival industry. While not desiring in any way to oppose legitimate developments in this direction, the gas industry cannot afford to regard with indifference facilities granted to electricity which are denied to itself, or that the great superiority of gas over electricity from a coal conservation point of view should be ignored. So we are prepared to join in opposition to these proposals in so far as they appear to prejudicially affect gas interests.

CO-PARTNERSHIP, FINANCIAL REVISION, AND OTHER MATTERS.

The DEPUTY-CHAIRMAN (Sir Fortescue Flannery, Bart., M.P.), in seconding, said he must refer to the exceedingly comprehensive character of the speech of the Chairman, which had dealt in a broad manner with nearly every one of the important points affecting not only this Company but the whole of the gas industry at the present time. He thought everyone in the room must have been struck by the fact that the 3d. reduction in the price of gas was already in jeopardy, and this because of the threatened increase in the price of coal. This was an illustration, if one were wanted, of the vicious circle in which they as a nation had been travelling during the war, and in which they seemed to be continuing now that hostilities had ceased, whereby increases of wages to one section of workers benefited nobody if it led to an increase in the cost of living. If the price of coal was further increased, then the price of every commodity in the country would be increased accordingly. He believed that the cure for all ills of industrial life would be found, and must be found, in co-partnership. They had heard their Chairman speak of the development of the system which had been made in their own Company, by which there had been an extension of the functions of the Co-Partnership Committee. If those present could see this Committee sitting round a table discussing every question relating to employment in the most friendly manner, they would agree with him that in this system lay the solution of all labour difficulties. He believed that trade unionism was coming round to the belief—the correct belief—that the larger the production the greater the employment for workers and the chances of an increase of wages, as well as the better able would the community be to compete with other nations. In similar manner, he believed, if trade unionism had been against co-partnership, it was now undergoing a change. One other point. That was the question of the post-war settlement of the statutory financial position of gas undertakings. Their Company had need, all gas companies had need, of extending and improving their plant. They could only do this by raising more capital upon proper terms. It was absolutely impossible to do so under present conditions of dividend limitation under the Act passed in the last Parliament, although even the terms of the Act were a great deal better than those at first proposed. But it did not do justice to the gas companies; and further legislation would be absolutely necessary. He hoped this would be undertaken before long in the present Parliament. Otherwise, the gas industry could not survive in its full utility to the community at large.

Mr. JOHN RANDALL expressed the approval he felt at seeing the co-partnership scheme develop into a Works Committee. It was a great advantage indeed; and he hoped it would prove a benefit to the Company and the community generally. He was in favour of the Whitley report in the general interests of the country. He had had to do with employers in negotiating on behalf of trade unions; and, in suggesting a way out of difficulty and a solution all round, he could not see a better method than by increasing the meetings between employers and employed. There was one clause in the scheme that had been put forward which he was extremely glad to see. It was this, that in cases of difference of opinion between the Works Committee and the Manager, appeal should be to the Chairman. It was no reflection upon the leading officials to say that, though the official view was the Company view of the matter under consideration, it was a great thing for the workers to feel that they had the right of appeal to the Chairman, who could take a broader view of any question in dispute. He had no doubt this would add greatly to the smooth working of the arrangement. In his opinion, the way to improve things was for an industry to come together, and consider what were the reasonable claims of the workers, and how they could be met with the greatest amount of fairness to the general body of consumers. The co-partnership system in the gas industry should be almost an ideal solution of difficulties. He was glad to see the step taken by the Directors; and he thought it would add to the smooth working of everybody connected with the Company.

The motion was unanimously carried.

THE DIVIDENDS.

The CHAIRMAN moved the declaration of dividends for the half year at the following rates per annum less income-tax: 5 p.ct. on the preference stock, and 3¾ e.ct. on the ordinary stock and the West Kent ordinary stock.

Sir JOHN BORASTON, in seconding, said if he were to express himself in terms of superlative satisfaction with regard to the dividend, it was possible there were proprietors present who, like himself, purchased stock when it was above par who might doubt the sincerity of his enthusiasm. [Hear, hear.] At the time when the Government was willing to pay 5 p.ct. on loans, a dividend of 3¾ p.ct. might not arouse any great sense of jubilation. At the same time, if they took a mental view of the conditions under which the gas industry was labouring, he thought they had grounds for reasonable satisfaction and congratulation. They had obtained some relief. Everything was relative. While 3¾ p.ct. was not a great dividend, it was better than the 3½ p.ct. paid last time, and better than the inevitable dividend they would have been paying under the sliding-scale terms. They hoped that in due course they would again be paying dividends more nearly approaching those obtaining four or five years ago. While this was not the opportunity for discussing future prospects, he thought he was entitled to remind the proprietors that the Company did stand in an exceptionally good position with regard to the possibility of future development. They were happy and fortunate in having the guidance of a Chairman of almost unique experience in gas matters, who possessed courage, business capacity, energy, and initiative, and who constantly excited the admiration of those whose privilege it was to work with him.

The motion was agreed to.

RE-ELECTIONS.

The DEPUTY-CHAIRMAN next moved the re-election of the retiring Directors—Mr. Charles Hunt and Mr. Charles Carpenter, D.Sc. He remarked that the proprietors were fortunate in having upon the Board such a large proportion of professional talent. In the whole of the gas world, they would not find two engineers more eminent, more looked up to by their fellows, and more valuable to any Board than the two gentlemen named.

Mr. W. G. WALLER, in seconding the motion, observed that the

retiring Directors were two great co-partners; and they had endeared themselves to the employees generally.

The motion was heartily carried.

The re-elections having been acknowledged,

On the proposition of Mr. R. GARRAWAY RICE, seconded by Mr. B. H. LATTER, Mr. Ernest W. Drew, F.C.A., was re-appointed one of the Auditors.

VOTES OF THANKS.

Proposed by the CHAIRMAN, and seconded by Mr. G. R. CLARKE, a hearty vote of thanks was passed to the Engineer (Mr. S. Y. Shoubridge), the Secretary (Mr. Wilfrid Wastell), their staffs, and the employees generally. The Chairman referred to the anxious time the officers have passed through during the whole period of the war; and they all deserved thanks for their great assistance and loyal co-operation. He freely acknowledged the personal obligation he was under to them all.

Moved by Mr. R. GARRAWAY RICE, and seconded by Mr. FREDERICK H. PILLEY, a cordial vote of thanks was also passed to the Chairman and his colleagues.

NEWCASTLE AND GATESHEAD GAS COMPANY.

Annual Meeting of Proprietors.

Mr. John E. Cowen (the Chairman) presided over the annual meeting of the Company, and, in moving the adoption of the report, said it was very difficult in times like the present to make estimates which would meet all contingencies which arose in the way of sudden and unexpected increases in the cost of wages, coal, and other materials. They had, however, been fortunate in so regulating their charges that on the year's working, after providing for all interest and dividend at the statutory rate of 3½ p.c., they were only short by £391, which would come out of the sum brought forward from last year, leaving the amount to be carried forward to 1919 as £3021. On the question of wages, he said there was a general advance at the end of 1917, and there had been two during 1918, and an application for a further increase had been recently received. In 1913, their total wages and salaries bill was £153,000; and in 1918 the amount was £271,000. The price of coal had increased by 10s. 6d. per ton since the outbreak of war; and oil, which immediately before the war they were purchasing at under 3d. per gallon, in 1918 cost 1s. 5d. per gallon. These items of wages, coal, and oil alone represented a total of £345,000 increase upon pre-war figures, and were equal to 1s. 2d. per 1000 c.ft. of gas sold; while the average price received for gas sold only showed a net increase of 9½d. per 1000 c.ft. The Directors regretted it had been necessary to increase the price of gas by so much as 6d. per 1000 c.ft. The total increase to date to the small consumer represented 60 p.ct., which compared very favourably with the increases in price of other commodities.

The Chairman dealt with the financial hardships imposed upon gas companies during the war, and declared that, in view of what the gas industry of the country had done to meet national requirements, it seemed inconceivable how such treatment could possibly be considered reasonable. Moreover, how any body of business men could imagine that the stability of any industry could be maintained, or progress achieved, under such conditions, was, to him, incomprehensible. Redress was certainly needed; and steps were being taken to press the matter upon the authorities, through the National Gas Council. Even in normal times it was very difficult to give any accurate forecast with regard to the future; and in the present condition of affairs, no one would think of attempting it. They could not, of course, expect to maintain the large sales of gas which the war occasioned. There would be some advantage from this, inasmuch as during the last two years at least the plant had been taxed beyond economical working to meet the demand; but they could with advantage do with an increased consumption on pre-war quantities. They must, therefore, endeavour to expand. When the period of transition from war to peace had been overcome, it was expected that there would be more gas consumption in factories than there was at the present moment, as many industrial concerns which had acquired experience in the use of gas during the war would no doubt continue to use it. When the rationing of gas ceased, they might also expect more domestic consumption; and when the 50 p.ct. embargo on public lighting was removed, there would be increased consumption in this direction also. In housing schemes gas could be very largely used with advantage to the community; and the Board were bringing this prominently before the interested authorities. In public lighting improved burners giving greater effective lighting were now obtainable. They would no doubt have severe competition; but with a progressive policy, and by giving good service to customers, there was plenty of room for expansion.

Labour was in a very unsettled condition; but in regard to their own men, he could say that, as a body, they had worked well, and their relations had been cordial. No one responsible for the direction or management of business could, however, regard the general outlook without anxiety. The spirit exhibited recently in various trades by what he believed was only a section of the workmen, was certainly inimical to the best interests of the men themselves, as well as most damaging to the country. He would ask the men not to be led away by the noisy element, often inspired by aliens of doubtful reputation, but to think for themselves, and be guided in their thoughts by leaders who had shown themselves loyal to the best interests of trades unionism, as well as to their country. Concluding, he mentioned that 78 of their men had been killed in the war.

The report was adopted, and a dividend was declared at the rate of 3½ p.ct. per annum. On the question of dividend, the Chairman pointed out that, in their own case, the financial hardships arrangement meant that if they unfortunately found it necessary to increase the price of gas, further to meet advances in wages or rises in cost of coal or other materials, they would be compelled to reduce the dividend to three-quarters of the 3½ p.ct. standard—*i.e.*, 2⅝—whereas their pre-war dividend was 4½ p.ct. This, too, while the Government were paying over 5 p.ct. for the money they required.

In reply to a vote of thanks, the Chairman said: The position is hopeful; and the whole thing depends to my mind upon this: Are we to be obliged to meet present-day conditions, as to prices of material and labour, under an antiquated sliding-scale, fixed thirty or forty years ago, to meet entirely different conditions? If we are, then I think we are going to be unduly hampered and badly treated by Parliament and the country. Every other industry which has done anything to help the country during the war has been enabled to make a profit out of it, and to pay pre-war dividends—many of them in excess of pre-war dividends. We have done as much as any other industry for the country during the war. We have used our capital and our resources in the interests of the country; but the treatment we have received is far from equitable, and far from right. I am sure this matter requires pressing as much as possible with all the weight of the gas companies' shareholders throughout the country upon Parliament; and some modification must be secured if the industry is to progress under the conditions that are likely to prevail in the future.

LIVERPOOL GAS COMPANY.

Annual General Meeting.

The Annual General Meeting of the Company last Wednesday was presided over by Mr. H. WADE DEACON (the Chairman), who, in moving the adoption of the report, said they had passed through a very trying year. It was difficult to speak at the present moment about the state of affairs, and they could only trust that, with the general good sense that was found in the great majority of men and women, there would not be too great a dislocation of the trade of the country. Like all statutory companies, they were strictly limited in the amount of dividends they might pay; and, like most large gas companies, they worked under the operation of a sliding-scale. This came into operation in their case after the beginning of the war; and as they had never had any benefit from the working of the scale, they were especially hard hit by having now to reduce dividends. They lodged a Bill in Parliament last session, intended to remove temporarily the disabilities under which they laboured. Subsequently, a Government Bill was passed, which gave the Board of Trade power to authorize the payment of three-fourths of the standard dividend, whenever it would have to be reduced below that point under the sliding-scale. They accordingly withdrew their own Bill, though under the Government Bill they did not get all they wanted. In their case, if the price of gas were increased beyond 3s. 2d. per 1000 c.ft., the Board of Trade could authorize a dividend of 3¾ p.ct. This was a relief; but they found it, none the less, a hardship that they were bound by a scale which was quite satisfactory under pre-war conditions, but was absolutely inadequate to meet the new circumstances brought about by the war.

That the whole question would need revision was admitted by Sir Albert Stanley, the President of the Board of Trade, when he said, in connection with the Relief Bill he introduced: "I think it is quite clear that, whatever relief is given to these undertakings after the war, it will be necessary for the Government to consider very seriously the whole situation, not only with respect to the undertakings now under discussion, but also with regard to all statutory undertakings which are limited in their charges by Acts of Parliament, in some instances passed many years ago. After the war, it is very likely that we shall be living under entirely different conditions; and therefore it will be necessary to consider whether the bases upon which statutory limitations have been established are, under the altered circumstances, reasonable and fair." It was obvious from the present state of affairs that they would never get back in their lifetime to the pre-war conditions. The Directors, as well as the National Gas Council, of which they were members, were giving the whole matter most careful consideration, and would take such action as might be advisable.

Various restrictions had been placed on the use of gas, principally for domestic purposes. Their sales for the year had decreased by 1¼ p.ct.—a smaller decrease than might have been expected; but the restrictions were not in force for the whole year. Owing to having to use Lancashire instead of Yorkshire coal, the manufacture of gas had been carried on under great difficulties. There was a shortage of supply; and they were obliged to use up their stocks of coal to a dangerous extent, and were, to all intents and purposes, living from hand to mouth. There was, therefore, still urgent need for consumers not to use more gas than they absolutely required.

After dealing with the accounts, the Chairman said the price of gas for the present remained at 2s. 10d. per 1000 c.ft.; but they were only now beginning to feel the full effect of the higher costs of production, and any further increases must reflect upon the cost of their products.

Following upon the dividend of 2½ p.ct. declared last August, a further dividend at the same rate for the half year ended Dec. 31 on the ordinary stock was agreed to.

Coal Required at Elland.—The shortage of coal at Elland is such that the Elland-cum-Greetland Gas Company have had to reduce the pressure in the mains, and have appealed to factory owners to help in every possible way to tide over a serious difficulty.

Lamp-Breaking Epidemic.—Prosecuting a number of boys at the South-Western Police Court for breaking street gas-lamps in the Borough of Battersea, Mr. Paul Caudwell (Borough Solicitor) stated that since last November there had been an epidemic of lamp-breaking in the district; and damage to the extent of about £30 had been done by gangs of boys. In addition, some of the lamp-fittings had been stolen. In another case, in which boys had broken an electric lamp, it was stated that about £50 worth of damage had been done to electric lamps within a month or two.

BOURNEMOUTH GAS AND WATER COMPANY.

The Ordinary General Meeting of the Company was held on Friday last, at the London Offices, No. 90, Cannon Street, E.C.—Mr. WILLIAM CASH, F.C.A. (the Chairman), presiding.

The SECRETARY (Mr. H. A. Plumb, F.C.A.) read the notice convening the meeting, and the minutes of the previous meeting; and the Directors' report and the statement of accounts were taken as read.

THE ACCOUNTS.

The CHAIRMAN, in moving the adoption of the report and accounts, said he did not think it would be necessary to detain the proprietors long in connection with the operations of the past half year. Turning first to the accounts, it would be seen that the capital account showed a credit, by reason of the fact that expenditure had been very small, and that the depreciation for the half year ended Dec. 31 exceeded the amount of such expenditure. This result was due partly to the fact that, under war conditions, all extensions had been stopped; but, as the proprietors were aware from the Bill of the Company which was before Parliament this year, the time would shortly arrive when they would have to spend considerable sums on extensions.

LESS GAS SOLD.

Gas sales during the half year were down by 16 p.ct., and to the very substantial amount of over 100 million c.ft. In consequence of this, it was not necessary to use the Bourne Valley works, as had at one time been contemplated. The reduction in output was due largely to the Fuel Rationing Order, which had had the effect with the large consumers of reducing their consumption by 24 p.ct. On the other hand, however, the consumption by prepayment meter was up by 2·36 p.ct.; and there had been a larger quantity of gas used for public lighting, which had been gradually restored. With reference to gas prices, the charge in Bournemouth during the past half year was 4d. per 1000 c.ft. higher than in the corresponding period of the previous year. In Poole, it was 3d. higher, arising from the fact that the period of differential charges had now expired; and in Christchurch, for a similar reason, it was only 2d. higher. On the credit side of the revenue account, it would be noticed that, largely owing to war conditions, the profit on sales of fittings was £2000 less than was the case a year ago. Glancing at the debit side, he might point out that the quantity of coal used was 13,300 tons less than in the corresponding half year, due to the reduced sale of gas. The price had been very much the same as in 1917. They had had to complain considerably of the bad quality of the coal; and there had also been difficulties (having their origin in the same cause) arising from spontaneous combustion. As in the case of other companies, the price of oil had very greatly increased—having gone up from something like 5½d. per gallon to 11½d. The Company had done well with residuals, having regard to the fact that they had had much less to sell. The residuals were only £700 down, partly arising from the fact that they had charged their own department at the higher price of coke for manufacturing carburetted water gas. Therefore coke under this head cost them £4500 more. The water receipts were £800 up. Bournemouth had been practically full, with no empty houses, which accounted for this. Carbonizing wages, even with 100 million c.ft. less gas sold, were £700 up. The Directors had included this half year for the first time, at the foot of the revenue account, a statement which disclosed the total amount of wages paid. Of course, wages were included in almost every item—under the headings of manufacture, distribution, and repairs. The statement to which he had referred revealed the enormous sums which had had to be paid for labour; and, in addition, it had to be remembered that these amounts had been paid to a smaller number of workpeople. A comparison was given between the last pre-war half year, the last half of 1917, and the six months now under review. It showed, when comparing one figure with another, that the expenditure, simply in money, apart from the number of men, was 63 p.ct. up. The most serious item of increase that had to be met was under the head of repair and maintenance of works. Materials, of course, cost them a great deal more. Retort repairs had been rather considerable; the total amount under this head showing an increase of over £11,000. These were the principal features arising out of the revenue account for the half year. Arriving at the net figure carried to the profit and loss account, it would be seen that in the past half year they had not earned their dividend by £4400; but taking the whole of the year 1918, and remembering that the price of gas had been higher, they had practically earned their dividend on the twelve months. The balance-sheet disclosed a strong position. Their resources were sufficient for present requirements; and they were able to recommend this half year, under the provisions of the sliding-scale, 12 p.ct. dividend on the original stock, and 7 p.ct. on the ordinary or maximum stock. Now, this dividend was more than it was in June, 1918; and he had explained on the last occasion why the dividend in June had to be reduced—it being due to the fact that they had to deal with periods of twelve months under the arrangement of the sliding-scale, and in June the proprietors had to suffer from the fact that, consequent on the increased price, the dividend had to be adjusted.

THE COMPANY'S BILL.

He did not propose at this meeting to deal with the Bill which the Company had in Parliament, because there had already been a meeting of shareholders at which the Bill was formally approved; and there would be sent to the proprietors, with the report of these proceedings, an account of what transpired on that occasion. The endeavour of the Company in the future would be, as it had always been in the past, to work amicably with the local authorities; and the Board much regretted that it appeared as though a contest in the Committee rooms was inevitable. They only desired to do their duty to the proprietors, to the public they served, and particularly to carry on their works and extensions in such a manner as would best give a sufficient supply of gas to the whole district at the cheapest possible price.

THE OUTLOOK.

Perhaps he might just say a word or two about the outlook. The difficulties of the past half year had been very great, and, of course, the gas industry was faced with the national position which had arisen in regard to coal. If any substantial alterations were made in hours of work or rates of pay, it must react on the price of gas; and probably it would react on the gas industry more than on any other, because, while in other industries coal was used for steam raising purposes, for the gas industry it was the raw material from which was manufactured the article they sold. The demands of the miners was a matter in which they could not intervene; it was a national question. That it was a very serious one, they, of course, all recognized. Coal was the very life-blood of all business in this country. With regard to the working of the railways, again, there was a difficult position to be faced, which must affect their industry. They could not say whether sooner or later it might not be a question of a revision of rates. Then, coal was used in the bunkers of the ships which brought the Company's coal by sea from the North to Poole; and, again, this reacted on the price of freights, and would affect the charges for coastwise shipping. He alluded to this matter, because just at the moment labour in the gas world was also asking for further increases in pay, and had raised the question of hours. The question had gone to arbitration, which took place the previous day. It was, of course, impossible to say yet what the result would be; but it did seem to the Directors that this was a particularly unfortunate time for labour to suggest that still further concessions and increases in wages should be granted to them, when the gas industry was liable to be severely and adversely affected by such other matters as that of coal.

NO PROFITEERING IN GAS.

It had been said over and over again that the gas industry, of all businesses, could not be charged with being profiteers. While in some industries it was possible for the increase in cost to be put on the article which was sold to the consumer, and for the manufacturer to re-imburse himself in this way, in the gas industry, though the increased charges could be put on to the gas, the effect of the parliamentary enactment was that the return to the proprietors became automatically less. All these increased charges acted and re-acted; and where one was dealing with a commodity such as gas, which was practically a rational necessity, the result was inevitably that the working man himself had to pay more for his gas. This tended to retard the consumption of gas, and it also tended to restrict the fittings business, the sale of cookers, the provision of fires, and the employment of the fitters who dealt with this work. The decreased consumption must, further, tend to increased cost. The increased charges for gas for public lighting tended to put up the rates of the town, which, again, had to be met by the householders who paid them.

THE RECENT STRIKE.

One matter about which he ought to say a few words was the strike which took place at Bournemouth in the early part of November. It was the first occasion in the history of the Company on which they had had any serious disagreement with their employees. The relationship with them in the past had always been very good; and they had had, and still had, many loyal and faithful employees—men who had stuck to them during the war, though they had had temptations to go and work in local munition factories at higher wages. The great bulk, in fact, had remained faithful to them. He desired to take the opportunity of saying that the Board of this Company had always felt every sympathy for their men. They had endeavoured to do their duty, both by treating them fairly, and by holding the balance reasonably and equitably between them and the consumers. The strike was brought about apparently by the disappointment of the men with an award which resulted from an appeal by them for an increase of wages. He ventured to say that their action was extremely ill-advised. Mr. Moon was placed in a very difficult position; but he had the assistance of a certain number of volunteers. Foremen and clerks also helped in the works; and men who had remained loyal assisted him to carry on during the four days which the strike lasted. At the end of this time, the men returned to work. One reason he had for alluding to this matter was that, since this time, there had been a meeting with the men. Sir Daniel Goddard and himself went down and had a conference; and they suggested to the men that strikes were of no advantage to anybody, and that the existing co-partnership scheme rules and regulations might be so amended as to form a means of discussion in future in the case of any difference or grievance that might arise. The men seemed to rather welcome a proposal for an arrangement that might lead to discussion of an amicable character across a table; and he ventured to hope that the meeting with them would bear good fruit, and that they might not be faced again with a situation such as they had lately had to meet. He pointed out to the men one fact which a great many people knew and yet overlooked, and that was that the shareholders who were joined together in an undertaking of this sort were not a great body of rich capitalists. In their Company, the average individual holding of stock was only £270; and the aggregate return to the shareholders on the dividends paid for the whole of the capital of the Company actually subscribed—he was not dealing with market prices—was only 5·23 p.ct. So that no one could suggest that the investors in their undertaking were extravagantly remunerated for the money they had put into it.

THE NATIONAL GAS COUNCIL.

The Company had joined the National Gas Council. The Directors believed that the Council would do great good in dealing, as a united body of the gas industry, with the difficult questions that were arising from time to time in regard to coal, labour, and materials. They were not new problems, but the same problems intensified to-day as they had had in the past. They were serious, there was no doubt, because, if extension of business was to take place, one could not expect capital would be attracted to the industry on the same terms as in the past. Parliament might be asked to revise the conditions, and perhaps the basis of the constitution of many companies; and possibly this might take concrete form before very long. Whether it would include provision for labour to share in the profits of the undertaking, was a matter they had not met to discuss that day. He still believed the gas industry possessed wonderful elasticity, and was capable of meeting its

difficulties as and when they arose; but that they did exist was the actual fact to-day.

THE STAFF AND EMPLOYEES.

Before sitting down, he would like to pay tribute to the loyalty of those men who had stood by them, and to the Acting Engineer and General Manager (Mr. P. G. G. Moon) for the splendid work that he had done during the past half year; and last, but not least, he would like to draw attention to the fact that Lieutenant-Colonel H. W. Woodall, of whom they were all so proud, was with them that day. They welcomed him home, and hoped that in a very short time he would be able to take up his regular duties with them. Reference was made in the report to the services Lieutenant-Colonel Woodall had rendered to the Empire. He had been Assistant Adjutant and Quarter Master General, 1st (Peshawar) Division, with whom he had seen fighting on the North-West Frontier. He had also been Assistant Quarter Master General, Army Head Quarters, India. In these positions he had carried out most responsible administrative duties, dealing with very large interests and great numbers of men. They congratulated him on his safe return.

Lieutenant-Colonel CHARLES L. MORGAN, C.B.E., seconded the resolution, which was carried unanimously.

THE DIVIDENDS.

On the proposition of the CHAIRMAN, seconded by the Right Hon. Sir DANIEL F. GODDARD, the statutory dividends were declared, at the rates per annum, less income-tax, of 12 p.ct. on the original shares, 7 p.ct. on the "B" ordinary shares, and 6 p.ct. on the preference shares.

THE RETIRING DIRECTOR AND AUDITOR.

Proposed by the CHAIRMAN, and seconded by Sir CHARLES J. JESSEL, Bart., Sir Daniel F. Goddard was re-elected a Director; while Mr. R. H. Glen, F.C.A., one of the Auditors, was re-appointed, on the motion of Mr. F. H. PILLEY, seconded by Mr. A. C. T. STEVENS.

The CHAIRMAN pointed out that Mr. Glen also had been on war-work, laying mines and otherwise assisting the navy. They were glad he had got safely back from such arduous and perilous work.

VOTES OF THANKS.

The CHAIRMAN, proposing a vote of thanks to the staff for their services in the past half year, said the Board very much appreciated the work they had had from the loyal employees, and particularly that of Mr. Moon and his assistants at the Poole works.

Mr. GLEN seconded the vote, which was heartily accorded.

Lieutenant-Colonel WOODALL said he was very much obliged to them all for the kind way in which they had received him; and he wished to thank both the Chairman and Mr. Moon for the very regular letters and reports they had sent him while he was away.

Mr. MOON returned thanks on behalf of the staff, and said he would like to point out how large a share of the vote was due to the works superintendents and heads of departments in Bournemouth for the very loyal and faithful work they had done under somewhat trying conditions. He would also like to say publicly, for the staff at Bournemouth, how delighted they were to have their chief and friend back with them again. They trusted he might be spared for many long years to inspire and direct them.

The proceedings concluded with a vote of thanks to the Chairman and Directors, which was accorded on the proposition of Mr. GLEN, seconded by Mr. F. G. PILLEY.

SULPHATE PRICES IN FRANCE.

The text of a convention between the French Ministry of Agriculture and the French Sulphate of Ammonia Board for the regulation of sulphate prices in France is published in the latest issue of the "Journal des Usines à Gaz." In accordance with this arrangement, the French production of sulphate from Jan. 1 to April 30 last year, with the exception of that of the sewage companies, is to be sold on the instruction of the Central Office of Agricultural Chemical Products by the French Sulphate of Ammonia Board, represented by M. Auguste Levy, 57, Chaussée d'Antin, Paris, at prices not exceeding 96 frs. per 100 kilos for average sulphate, or 100 frs. per 100 kilos for extra-dry, delivered on transport vehicle at producer's works. These prices apply also to deliveries made entirely by wagon. Payment, at the choice of the buyer, may be either at a discount of ¾ p.ct. in the case of payment on delivery, or without discount on deferred payment; the buyer defraying the cost of returning empties. Buyers supplying the producing works with bags or cases for 100 kilos are allowed a rebate of 4 frs. per bag. All producers of sulphate are to make a fortnightly return to the Central Office of Agricultural Chemical Products of the tonnage of sulphate manufactured, deliveries made, stock at the end of each fortnight, deliveries due, and estimates of manufacture during the succeeding period.

The Central Office will dispose of all stocks of sulphate in producers' works on Dec. 31, 1918, of the 6550 tonnes imported from England, and the 2000 tonnes held in powder-making establishments. In the case of the December stocks, the Central Office will dispose of them, under the arrangement to restore the quantities in June, 1919, at the prices which the Minister of Agriculture has fixed—viz.: 125 frs. for ordinary sulphate and 130 frs. for "extra dry." There is, however, provision for the contingency that the previous order (that of June 20, 1918) may be modified before May 1 of the present year, in which case the Central Office can demand payment of average prices for sales made during the first five months of this year. The Central Office will pay to sewage companies the bonus of 25 frs. per quintal delivered. Deliveries remaining to be made on Dec. 31, 1918, on the orders of 1918 are made at the new prices as from Jan. 1 last.

For tonnage imported from England and that from powder-making

USE Simmance's

DEAD BEAT INDICATORS

instead of WATER-TUBE GAUGES and

"READ THE PRESSURE BY THE POINTER."

No liquid to evaporate and no levels to adjust.

No glasses to break and nothing to clean.

Direct reading, Open scale, Any range (Pressure, Vacuum, or Combination).

Incorrodible, Accurate, for foul or purified gas.

MADE IN MANY RANGES WITH TABLETS LETTERED AS DESIRED.

ALEXANDER WRIGHT & CO., LTD., WESTMINSTER.

Agents: Australia—FYVIE & STEWART, 360, Collins St., Melbourne; Canada—W. P. ROPER, 502, Merchants' Bank Building, Montreal.

works, payment is made to M. Levy, and by him remitted to the Treasury, with a deduction of ½ p.ct. Conditions of delivery, payment, and reception of goods will be the same as those for other French products. For the purpose of encouraging the manufacture and distribution of sulphate during the spring of the present year, the French Ministry of Agriculture will endeavour to assist producers in as large a measure as possible by supplies of coal, &c.

In a note explanatory of the new Convention, M. Levy points out that the Order of June 20, 1918, provided that sulphate of ammonia taken by the Ministry of Agriculture during the second half of 1918 at the price of 125 frs. and 130 frs. cannot be disposed of at the present time at lower prices. A Bill was brought forward by the Government on Jan. 14 last, tending to modify this provision, according to which producers may be reimbursed by the amount of the difference between the prices of 1918 and those of the present Convention. In the event of this Bill not becoming law, the Central Office will, on June 1 next, return to producers a tonnage equal to that which they had in stock on Dec. 31, 1918, at the prices of 125 frs. and 130 frs. The Central Office will make payment for these tonnages to the producers, by whom a return of tonnage at average prices will be made to the Central Office. M. Levy states that an arrangement for the liquidation of December stocks became necessary in order to avoid a risk of dislocation of the market, inasmuch as the new prices fixed in France for nitrate fertilizers are appreciably above those in Great Britain.

CURRENT SALES OF GAS PRODUCTS.

The London Market for Tar, Tar Products, and Sulphate.

LONDON, *Feb.* 24.

There is no particular change to report in the London tar products market. Shipments of pitch continue in full swing, and the price is well maintained at over 65s. per ton net in bulk at makers' works. Solvent naphtha still continues weak. There is little demand for this article; the price being called from 2s. 9d. to 3s. per gallon net at makers' works. On the other hand, benzol for motor spirit is in good request. Orders for tar for road work are now being placed; and a good demand is expected in this connection.

Sulphate of ammonia remains without change.

Tar Products in the Provinces.

Feb. 24.

The average values for gas-works products during the week were: Gas-works coal tar, 34s. 6d. to 39s. 6d. Pitch, East Coast, 45s. to 47s. 6d. per ton f.a.s.; West Coast—Manchester 45s. to 46s., Liverpool 45s. to 46s., Clyde 45s. to 46s. nominal. Benzol 90 p.ct., North, 1s. 9d. to 1s. 11d.; 50-90 p.ct., naked, North, 1s. 10d. to 1s. 11d. Toluol, naked, North, 2s. 3d. Coal tar crude naphtha in bulk, North, 8d. to 8½d. Solvent naphtha, naked, North, 2s. 6d. to 2s. 7d. Heavy naphtha, North, 2s. 10d. to 2s. 11d. Creosote, in bulk, North, 5d. to 5½d. Heavy oils, in bulk, North, 6d. to 6½d. Carbolic acid, 60 p.ct., about 1s. 6d. Naphthalene, £20 to £25; salts, £6 to £7, bags included. Anthracene, "A" quality, 4d. to 6d. per minimum 40 p.ct.; "B" quality, 1½d. to 2d.

FROM A MARKET CORRESPONDENT.

Tar Products.

Considerable irregularity has developed in tar products of late; and while some products are firm, and even, in the case of pitch, strong, others, notably carbolic acid, are almost hopeless. Pitch in London maintains a strong tone, mainly because the market there is the most suitable at present for export business. At the East Coast ports, the shipping position still presents difficulties; but they are nothing to the troubles of a few months ago, and the situation may be said to be gradually improving. The briquette manufacturers in South Wales are making efforts to obtain their pitch at lower rates than the 55s. per ton delivered, or thereabouts, that they are now paying; and there is nothing definite as to what the Coal Control may do in the interest of trade there. Quotations, where they have changed, are higher on the week. Creosote also has been a very strong feature, and some remarkable prices have been paid. According to reports from many districts, it would be difficult to buy any quantity at 6½d. per gallon. Naphthas are easy; the solvent having fallen by about 3d. per gallon. As regards naphthalenes, the refined is rather offered, and is lower at about £26 per ton; and crudes are not quite so firm, although quotations are not materially affected as yet. Toluol remains about the same; and an extensive business is being done in benzol. The Motor Union, in a letter to the Press, point out that more than 6,000,000 gallons of rectified benzol were produced last year in the gas-works of the country, and this "is far too important a contribution of motor fuel to be allowed to disappear." They want the gas companies not only to continue their efforts to scrub the gases for benzol, but also to treat for the national advantage the thousands of tons of coal at present being carbonized with the gases left unwashed. The position of carbolic acid goes from bad to worse, and anything may happen. Makers of crystals still have stocks of crude which they purchased at high prices lately; and they are much concerned as to how they are to avoid serious loss. Crystals are nominally 7d. per lb., and it is quite likely that less would be taken. Crude 60's are nominally 1s. 3d. per lb., which is less than cost, and no business is being done. If prices come down to about 1s. per gallon, and makers of crystals—when clear of their present stocks—are able to buy at this figure, or a few pence more, they should be able to produce crystals at 4½d. per gallon. The situation is most uncomfortable; and it is impossible to say what may happen. Cresylic acid is a trifle firmer. Good inquiries

"PIONEERS" OF BLUE WATER GAS
FOR "JOINT USE" WITH COAL GAS.

DEMPSTER'S COMBINATION OF

C-W-G- AND
BLUE WATER GAS

APPARATUS "IS NECESSARY."

R. & J. DEMPSTER, LTD.,
MANCHESTER.

Temporary London Office:
BLENHEIM MANSIONS,
BROADWAY, WESTMINSTER, S.W.1.
London Office Telephone No. Vic. 7426.

are coming from local authorities for tar for road making purposes. Other products are without change.

In America, conditions in bye-products call for no special comment. In France, however, requirements are fairly heavy; but coal-tar products are at present largely manufactured locally. Xylol, toluol, solvent naphtha, &c., of French make are offered at cheaper rates than imported goods. Naphthalene is very dull, and the price for flakes, best quality, is not higher than 70 frs. per 100 kg. (say, £27 to £28 per ton). Liquid ammonia is now produced in France in good and, it is said, sufficient quantities at about the same prices as in England.

The range of home quotations is as follows:

Benzol: 90% London, 2s. 3d. to 2s. 6d. per gallon; 50-90%, 1s. 9d. to 2s. 3d. per gallon.

Carbolic Acid: Crude 60's 1s. 3d. per gallon; crystals 40% 7d. per lb.; pale liquid 98-99 p.ct., 3s. 8d. per gallon.

Crude Tar: London 40s. to 41s.; Midlands 34s. to 36s.; North 35s. per ton *ex* works.

Pitch: London, 67s. 6d. to 70s. per ton; East Coast, 45s. to 46s. per ton; West Coast 43s. to 44s., with Manchester 42s. per ton and Glasgow 47s. 6d. per ton; South Wales, 55s. per ton.

Solvent Naphtha: London 2s. 6d. to 2s. 9d. Provinces average 2s. 4d. per gallon.

Crude Naphtha: Naked 1s. per gallon.

Heavy Naphtha: 2s. 6d. per gallon.

Naphthalene: Refined £26 per ton nominal; crude £7 to £13 10s. according to quality.

Toluol: Naked, 2s. 9d. to 3s. per gallon nominal.

Creosote: London 6¼d.; North 5¼d.; heavy oil, 7d. per gallon in bulk.

Anthracene: 40-45%, 4½d. to 8d. per unit per cwt.

Grease Oils 18° Tw. (naked) £6 per ton f.o.r. makers' works.

Aniline Oil: 1s. 2d. per lb.

Cresylic Acid: 95% 2s. 9d. to 3s.; 97-99% 3s. to 3s. 3d. *ex* works London; f.o.b. other ports.

Sulphate of Ammonia.

There is very little change in the home situation to report. The product is selling well, and no orders are now being booked for short delivery; the bulk of business being done on the March-May basis of £16 15s. per ton. Future prospects continue an interesting source of discussion, and there is general agreement that present production can readily be absorbed in this country, especially while prices remain at the now attractive level for farmers. As regards exports, the present nominal price of just over £30 per ton does not represent true trading conditions; and when shipping is resumed, the export price is hardly likely to be as high as this figure. Further, as I have shown in past reports, our overseas markets are almost certain to be smaller in the future than they have been in the past—for some time to come at any rate; and it is hardly likely that anyone will be willing to pay higher prices than they have been paying hitherto. Consequently, it would seem that all the sulphate of ammonia manufacturers have to look forward to is not so much higher quotations as increased trade—and that from the agricultural community. Satisfaction is expressed that the Association intend to look after the home trade as well as endeavour to extend exports.

Motor Cyclists and Benzol.

A deputation from the Leeds Branch of the Motor Cyclists' Fuel Union are to visit the Leeds City Council to urge a cheap and plentiful supply of benzol, and suggest that the benzol produced at the city gas-works at New Wortley shall be sold to the public at prices from 1s. to not more than a maximum of 1s. 6d. per gallon, at which price limit, the Union say, these works have already supplied the Government with 15,000 gallons. It is held that, now that the benzol is not needed for explosives manufacture, for which purpose the plant was installed, the department could make concentration on benzol production for commercial uses a profitable undertaking at this price. A member of the Gas Committee, with whom the subject has been discussed, held that it would not be fair to put the product on the market at such a price in competition with the trade, though he did not deny that the benzol might be produced to sell at this figure. He added that at present sufficient benzol is produced at New Wortley to meet all the needs of the Corporation cars, omnibuses, and lorries, and leave a small quantity available for sale at the current controlled price. Some 200 to 300 gallons per day are produced at the works.

Irish Coal for Gas Manufacture.—Arigna (West of Ireland) coal is being used for the manufacture of gas at Sligo, with, it is claimed, when coke production is calculated, results equalling those of the best English gas coal.

Faulty Coke-Scales.—At Mossley, the Corporation were fined 10s. for having in their possession at the gas-works an unjust weighing-machine. Inspector Brooks said that the scrap machine used for weighing coke was unjust to the extent of 3 lbs. A sack had been placed in the scoop, to cover up a hole. Mr. J. M'Nichol (the Gas Manager) assured the Bench that no light weight went out of the gas-works. The machine was only used as a guide. A charge of aiding and abetting against Mr. M'Nichol was dismissed.

Sheffield Gas-Workers' Questions.—One of the points debated at the quarterly meeting of the Sheffield District of the National Union of General Workers was the unrest which is said to exist among employees at the Sheffield Gas-Works. Delegates from the works declared that this unrest was due to no consideration having yet been given to the application made in December last for increased wages and shorter hours. The feeling applied more particularly to yardmen, gas-fitters, and other sections who were still working the 53 hours. The Chesterfield delegates complained of a similar strain of conditions in their area.

SAWER & PURVES,

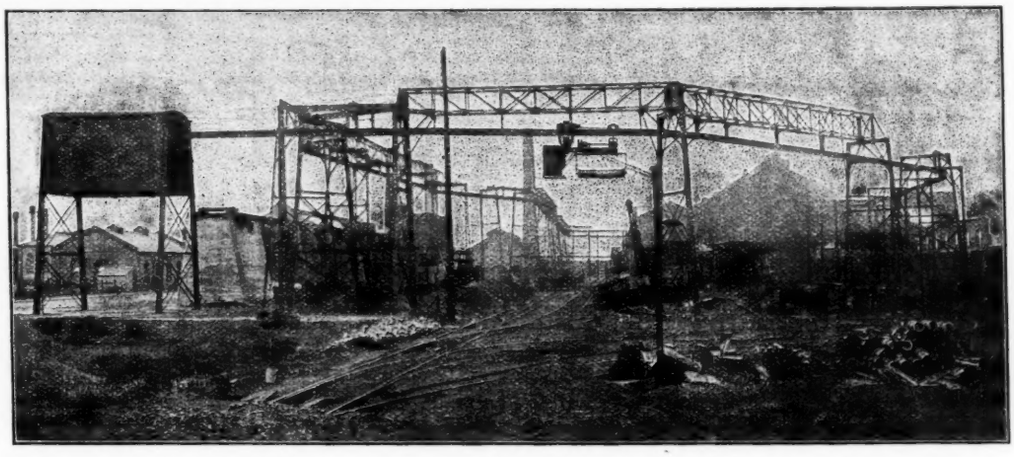
THE POSITIVE DRY PREPAYMENT METER

MANCHESTER & NOTTINGHAM.

FOR HIGH SPEED CONVEYING WITH

A MINIMUM OF LABOUR, POWER, & MAINTENANCE COST, USE

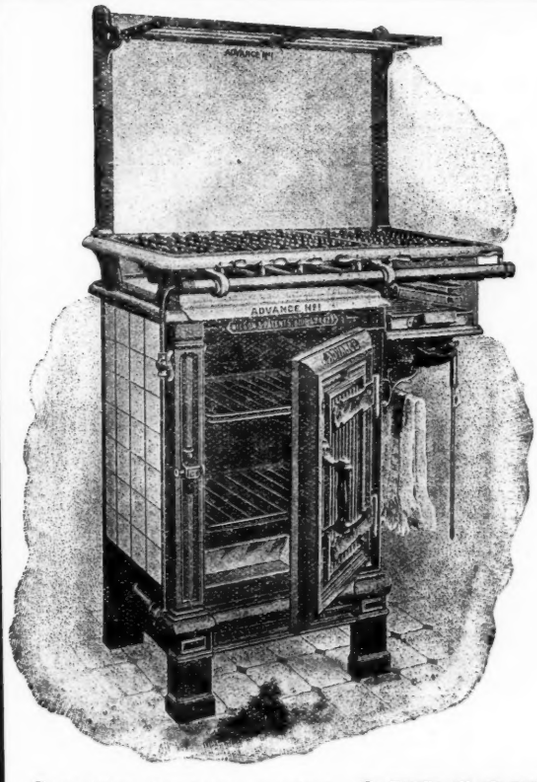
OUR MONO-RAIL TELPHER



In Use at:—

ALTRINCHAM
ABERDARE
AMSTERDAM
BECKTON
BIRMINGHAM
BLACKBURN
CARDIFF
DEVONPORT
DUNDEE
EXETER
GLASGOW
GREENOCK
HULL (GAS)
HULL (ELECTRIC)
KEIGHLEY
LEEDS
LEICESTER
LEA BRIDGE
LIVERPOOL
MANCHESTER (GAS)
MANCHESTER (ELECTRIC)
MERTHYR
MILL HILL
NEWPORT
POPLAR
PLYMOUTH
SOUTHPORT
STALYBRIDGE
STEPNEY
STOURBRIDGE
ST. PANCRAS
SOUTHAMPTON
SOUTH SHIELDS
STRETFORD
WALLASEY
WARRINGTON
WEST HAM
WEST HARTLEPOOL
WOLVERHAMPTON
WIDNES
WOOLWICH ARSENAL
WOOLWICH ELECTRIC
VICKERS LTD.
ETC. ETC. ETC.

STRACHAN & HENSHAW, Ltd., BRISTOL.



The "ADVANCE"

The **"WILSON POINTS"** (concluded below) have established beyond question that the **"ADVANCE"** stands supreme as the most comprehensive and perfectly-constructed **GAS COOKER.**

WILSONS' "Sixteen Points"

Concluded :—

Point No. 13 — **HOTPLATE**—includes the most economical and efficient burner for hotplate use—the "Star." The special feature is perfect combustion with flame contact. Burners are of various sizes and most conveniently spaced.

,, No. 14 — **METHODICAL DEVICES** — Matchstand, striker, and tilting receptacle for spent matches, taper-hanger, and movable towel-rail — a complete outfit for the convenience of the cook.

,, No. 15 — **ATTRACTIVE APPEARANCE**—The porcelain enamelling of so many parts, including inside and outside oven, backplate, crown-tray, and inside of grill-chamber, makes the Cooker thoroughly hygienic and most attractive in appearance.

,, No. 16 — **CHEAP IN MAINTENANCE**—The whole stove can be dismantled and ready for the washing tank in a few minutes and replaced as quickly.

Descriptive Pamphlets supplied on application :—

WILSONS & MATHIESONS, LTD.,

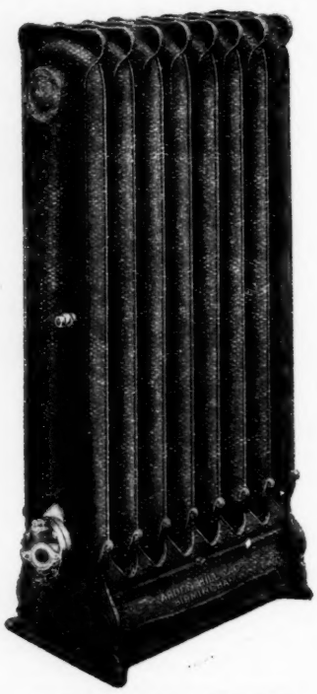
London Office :
76, QUEEN STREET, CHEAPSIDE, E.C.

Carlton Works, Armley, LEEDS.

Volker Mantles

Combine strength with durability, and embody all the essential features for good lighting. They are **BRITISH** made throughout with **BRITISH** material and by **BRITISH** labour, and always have been.

The Volker Lighting Corporation, Ltd.,
Garratt Lane,——————————LONDON, S.W. 18.



THE "MARS" RADIATOR.
Made in Three Heights.
Single and Double Loops.

Simple • Effective • Reliable.

NO COAL IS NEEDED AND GAS-CONSUMPTION IS AUTOMATICALLY CONTROLLED AND ECONOMISED.

ARDEN HILL & CO.'S

"MARS" Gas-Heated - Steam - RADIATORS

Are the Acme of Perfection in Gas-Warming Apparatus. They are very suitable for all classes of large buildings. They cost little to instal and little to maintain. They have lifelong wearing quality, and heat a room with less gas than is needed to properly light the same room.

WE ARE JUST NOW IN A FAVOURABLE POSITION TO GIVE PROMPT DELIVERIES, AND STRONGLY RECOMMEND EARLY ORDERS FOR SEASON'S REQUIREMENTS.

ARDEN HILL & CO.,
• "Acme" Works, •
BIRMINGHAM.

Powers of the Matlock Gas Company.

The powers of the Matlock Gas Company have been further investigated; and Mr. J. H. Hall, of Glasgow, has again appeared before the Urban District Council, and asked for permission to apply to the Board of Trade to grant him a licence to supply the town with electricity for lighting and power purposes. Some time ago, Mr. Hall was before the Council to explain his scheme; but the matter was then adjourned, with the object of enabling him to ascertain the extent of the Gas Company's powers in regard to electricity—it having been contended that they were such that they could prevent the launching of any electrical scheme in the town. Mr. Hall now informed the Council that he had had legal opinion on the alleged monopoly of the Gas Company over electricity; and he had been advised that they had no monopoly whatever. There was, however, a clause in the Act which gave them power to utilize their funds to make application for a Provisional Order to supply electricity. Explaining his scheme, Mr. Hall said it was his intention, subject to the approval of the Council, to run overhead transmission lines, with ornamental standards capable of accommodating lanterns for street lighting. He could not give them the exact cost of the electricity; but it would not exceed 6d. per unit. Then 25 p.ct. of the street lighting would be free; and he asked for a seven years' licence. The Council would always have the option of taking over the concern at a valuation. The Council, after discussing the scheme, deferred their decision.

No Further Increase at Ipswich.

The Right Hon. Sir Daniel F. Goddard, addressing as Chairman the proprietors in the Ipswich Gas Company, said that of their employees over a hundred had joined the forces; and they had lost only six. They had, however, left some rather sad gaps in the staff; and he specially alluded to Mr. Oliver Prentice, their cashier, and a very promising official. They had during the past year been through some very uncomfortable times in regard to coal; and occasionally there was only a week's supply left. In the matter of the Household Fuel Order, their Company had come off a great deal better than some others he was connected with. Taking the whole of the year, there was an increase in consumption of 1½ p.ct. As to the Temporary Increase of Charges Act, the Ipswich Gas Company would have to raise the price of gas another 1s. per 1000 c.ft., to come within its scope. The price of gas had gone up, and the dividend had gone down, but not to the extent necessary to come under the Act. Their charge for gas was 3s. 4d. In London, it was considerably higher; and the Ipswich price was equal to that at Newcastle, though they gave larger discounts. The total receipts amounted to £132,108, an increase of £13,901; and the revenue balance was £7766. They had practically earned the dividends recommended—at the rate of 10½ p.ct. per annum on the "A" stock, 8 p.ct. per annum on the "B" stock, and 7½ p.ct. per annum on the "C" stock, less income-tax. The Chairman said the dividend was 1½ p.ct. lower than last year. While the principal product required by the works had gone up 130 p.ct., the increase in the price of gas had been only 42 p.ct.

The Quality of the Gas at Plymouth.

Mr. J. H. Ellis (the Chairman of the Plymouth and Stonehouse Gas Company) has written to the Town Clerk of Plymouth with reference to the questions which were asked at the last meeting of the Town Council, as to the quality of the gas supplied by the Company and the Corporation's means of testing it. Mr. Ellis points out that the Company have fully and completely complied with the wishes of the Board of Trade in using the water-gas plant to its fullest extent, so as to husband the supply of coal. The Company have supplied the public with the best gas it is possible to produce from the quality and quantity of materials available. Not only so, but there has been the greatest difficulty in obtaining the material and labour needed for the improvement of the pressure. This work, however, is well in hand; and if the Company can surmount the difficulties of the next few weeks, he has little doubt that, by the end of June, they will not only be able to meet their normal legal liability, but to satisfy the consumers both as to the quality of the gas and the pressure under which it is supplied. In conclusion, Mr. Ellis remarked: "I need hardly say that any wishes your Council may express will have the most sympathetic consideration of my colleagues and myself. As owners of gas-works [the Devonport undertaking], the Council will, I feel sure, appreciate the wisdom of continuing that forbearance which the Board of Trade advised, and which the Council and the public have hitherto extended to us in a time of altogether exceptional stress." The Electricity and Street Lighting Committee had the letter under consideration on Friday, and decided to defer until their next meeting the questions of the appointment of gas examiner and the purchase of a calorimeter.

Matlock Gas Company.—In their annual report, the Directors state that, owing to a further serious advance in cost in connection with the manufacture and distribution of gas, they have been compelled to increase the price during the past year; but they emphasize the fact that the present charge for gas is still lower than that of the majority of gas undertakings in the country. The revenue account shows a profit of £2937; and they recommend a dividend making in all 5¾ p.ct. for the year, less income-tax, with £6245 carried forward.

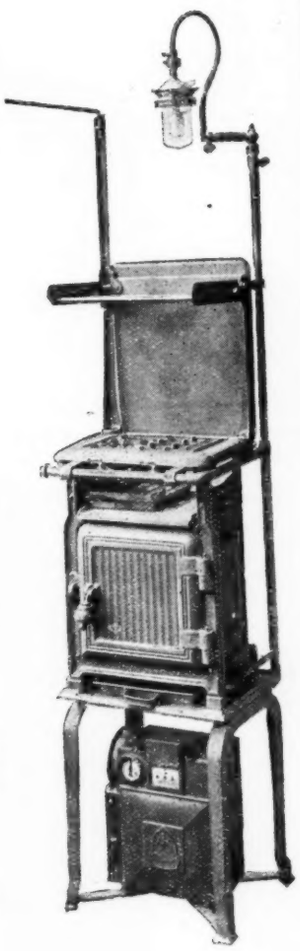
Year's Results at Sowerby Bridge.—The annual statement of accounts of the Sowerby Bridge Urban District Council, which has just been published, shows that the income on gas-works account during the year ended March 31 last was £26,719, and the expenditure £27,492. The principal item of revenue was a sum of £18,124 derived from gas and meter and stove rents. On the expenditure side, the manufacture of gas accounted for £16,795; while other outstanding items were: Maintenance, £1822; distribution, £1440; establishment charges, £2635; and land purchase, £1110.

A Complete
Slot Installation

THE MAIN COMBINATION

Comprising:

Prepayment Meter.
Cooker on Stand.
Plate Rack and Enamelled Backplate.
Towel Rail.
Inverted Incandescent Burner,
and Connection for Extensions.



Specially designed for Workmen's Dwellings, Flats, Bungalows, and Houses for more than one tenant.

COMPACT AND COMPREHENSIVE.

Economises Space, Piping, and Labour in Fitting.

R. & A. MAIN, LTD.

WORKS:
Gothic Works, Edmonton, N. 18
Gothic Ironworks, Falkirk
AND
Gothic Works, Birmingham

Showrooms & Branches:
25, PRINCES STREET, OXFORD CIRCUS, W. 1; 82, Gordon Street, GLASGOW; 18, Severn Street, Deansgate, MANCHESTER; 97, Millfield, BELFAST; 333, Queen Street, MELBOURNE; and 12, Cunningham Lane, Pitt Street, SYDNEY, N.S.W.

Sheffield Gas Company's Report.

The report of the Directors to be submitted at the annual meeting of the Sheffield Gas Company, on Monday, March 10, states that there has been a decrease of 10·23 p.ct. in the quantity of gas sold during the past year as compared with 1917. The sales have been affected by the smaller quantity used in the munition works since the conclusion of the armistice, and by the restriction placed on domestic consumption by the Fuel and Lighting Order. To meet the further rise in the price of coal and the continued increase in the cost of labour, the Directors have found themselves obliged to raise the price of gas to the general body of consumers to 3s. per 1000 c.ft. This, unfortunately, entails a reduction of the dividend, as from Oct. 1, on the converted Class C stock, at the rate of ½ p.ct. per annum; the standard price entitling the Company to the full 5 p.ct. dividend being 2s. 9d. per 1000 c.ft. There is a deficiency of £22,050 in the amount required to pay the authorized dividend, which will have to be taken from the sum brought forward, reducing the carry-forward to £26,629. The usual interim dividend of 5 p.ct. was paid for the half year ended June 30. Acting on the powers conferred upon them by the Sheffield Gas Act, 1917, the Directors decided on the conversion of the Company's capital stock. The Confirmation Bill of the Provisional Order enabling the Company to build new works on the 60 acres of land purchased at Wadsley Bridge, received the Royal assent on Nov. 21, 1918. The Sheffield Gas Act of 1917 authorized the Company to borrow on mortgage or create debenture stock to the extent of £485,000; and an extraordinary meeting, to follow immediately at the close of the ordinary meeting, has been called for the purpose of empowering the Directors to raise this sum.

Coal Shortage at Stony Stratford.—Owing to the prevailing shortage of coal, the Stony Stratford (Bucks.) Gas Company have turned off the gas for three hours in the morning and four-and-a-half hours in the evening.

Death of a Gas-Fittings Inspector.—A Manchester Corporation gas-fittings inspector named Washington Herbert Tinsley, aged 40, of Rushford Street, Levenshulme, went on Jan. 29 to the Gorton Lane works of Messrs. Crossley Motors, Ltd., to inspect gas-fittings. He stood on a 15-ft. ladder, and fell, sustaining a fractured skull. He was picked up unconscious, and remained in that state until the 17th inst., when he died. A verdict of "Accidental death" was returned at the inquest.

Rossendale and Bacup Gas Supply.—The report of the Directors of the Rossendale Union Gas Company for the half year ended Dec. 31 states that the sale of gas shows a decrease of 6½ p.ct., as compared with the corresponding period of 1917; the decrease being principally accounted for by the Gas Rationing Order. The profit is £4069; and the Directors recommend the payment of dividends of 10, 7½, and 7 p.ct. Nearly 90 million c.ft. of gas have been sold, realizing £18,863. The reserve fund stands at £14,127. Mr. William Fenwick has given notice that he will propose at the meeting that the remuneration of the Directors be increased by £100, making it £400 per annum, free of income-tax.

Economy in the Use of Gas at Wellingborough.—The experience of the Directors of the Wellingborough Gas Light Company, Ltd., has been like that of others, that the Household Fuel and Lighting Order brought about great economy in the use of gas, and imposed restrictions on the fixing of apparatus. The result has been a decrease of nearly 3 p.ct. in the sale of gas when compared with the corresponding half of 1917. Great difficulty has been experienced in obtaining adequate supplies of coal; and the stock is still very low. Out of an available balance of £7323, the Directors at the meeting yesterday recommended the payment of dividends for the half year of 6⅜ p.ct. on the original and 4⅜ p.ct. on the additional shares (less income-tax). This will absorb the sum of £2009, leaving £5314 to be carried forward. Under their sliding-scale provisions, the shareholders are penalized to the extent of ⅛ p.ct. per annum, for the recent unavoidable advance in the price of gas.

Winchester Water and Gas Company.—At the half-yearly meeting next Thursday, the Directors will recommend the payment of a dividend for the six months ended Dec. 31 at the rate of 4½ p.ct. per annum (less income-tax) on the consolidated ordinary stock. The balance of net revenue account available for division is £9087. The gas supplied through ordinary meters is largely reduced, due to the restrictions enforced by the Household Fuel and Lighting Order, 1918. On the other hand, the consumption through prepayment meters has increased; the smaller houses in Winchester at the present moment being very crowded, and the Order being in these cases less stringent. The Directors view with serious apprehension the future of the coal supply and of the cost of labour, though they hope that the scarcity of labour will be somewhat diminished, inasmuch as some of the former employees are now returning from active service. The conditions with regard to the execution of repairs remain unaltered; and further provisions are accordingly made in the accounts for this purpose.

Walker and Wallsend Gas Company.—In his address to the proprietors at the annual meeting, Mr. C. J. Potter, the Chairman, in moving the adoption of the report, said there had been a slight increase in the gross profits for the year. The gas sales had increased from 311,000,000 to 354,000,000 c.ft.; and the revenue had gone up £6664. During the war it had only been necessary to increase the price of gas 4d. per 1000 c.ft., which was a little under 14 p.ct.; and as one of the large gas companies in the south had made an increase of 73 p.ct. local consumers could be congratulated in getting off so cheaply. The Chairman referred to the sliding-scale; and said it was telling very much against gas undertakings. The National Gas Council were doing their utmost to get further relief from such an antiquated scale. The report was adopted; and dividends, less income-tax, for the half year ended Dec. 31, were approved, on the preference stock at the rate of £5 p.ct. per annum; on the 3½ p.ct. consolidated stock at the rate of £4 2s. 6d. p.ct. per annum; and on the 5 p.ct. ordinary stock at the rate of £5 12s. 6d. p.ct. per annum.

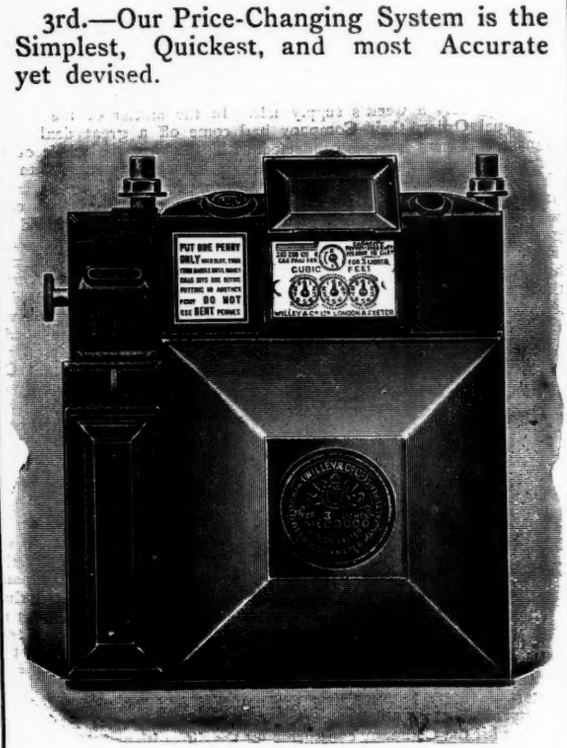
THREE POINTS

of advantage from the many found in our Slot Meters are:

1st.—They are Fraud Proof, and cannot be tampered with through the Slot.

2nd.—The Slot is closed when the maximum number of Coins have been inserted.

3rd.—Our Price-Changing System is the Simplest, Quickest, and most Accurate yet devised.



ALL PARTS INTERCHANGEABLE.

Tens of Thousands in use, and adopted exclusively by many Gas Companies.

WILLEY & CO., LTD.,

Exeter, London, Manchester, Leicester.

Telegrams:
"WILLEY, EXETER."
"GASVILLADO, KINLAND, LONDON."
"METERS, LEICESTER."
"WILMETER, MANCHESTER."

Telephone Nos.:
182 EXETER.
234 DALSTON, LONDON.
4777 LEICESTER.
7419 CITY (MANCHESTER).

LONDON WORKS & OFFICES:
89-95, Hertford Road, Kingsland, N.
LEICESTER:
5, Oxendon Street.
MANCHESTER:
John Street, Booth Street West, S.W.

AGENTS FOR SCOTLAND:
D. M. NELSON & CO., 20, WEST CAMPBELL ST., GLASGOW

Increased Sales at Whitby.—There was an increase in the sale of gas at Whitby during the year 1918, as compared with the preceding twelve months. To meet the increased cost of materials and labour, the price of gas had to be advanced. The profit and loss account, after charging interest and providing for the interim dividend, showed a balance of £1470, out of which the Directors recommended at yesterday's meeting the payment of dividends making 6 p.ct. on the original capital and £4 4s. p.ct. on the additional and new additional capital for the year—leaving a balance of £552 to carry forward.

Cost of Gas and Electricity in Manchester.—In the annual report of the Engineering and Metals Section of the Manchester Chamber of Commerce, it is stated that the section has had under consideration the proposal put forward by the Trading Profits Special Committee of the Manchester City Council to the effect that the gas and electricity departments of the Corporation be required to pay annual contributions in relief of rates equal to 1 p.ct. of their aggregate capital expenditure. A resolution was passed by the section deprecating this proposal, and recommending that all profits earned by the departments in question should be utilized, first, to place them on a sound financial footing, and, secondly, to reduce the prices of gas and electricity.

Longwood Gas-Works Transfer Agreement.—The annual meeting of the Longwood and Slaithwaite Gas Company is to be held on Thursday, when a report will be submitted, for the year 1918, in which the Directors say that the price of gas was raised on July 1 from 3s. 6d. to 3s. 9d. per 1000 c.ft., and notice was given in December of a further increase to 4s. 2d. These advances have been imperative in consequence of the continually increasing costs of coal and other materials and labour. The quantity of gas sold last year was 190,748,000 c.ft., an increase on the preceding year of 3,846,900 c.ft., or 2·02 p.ct. A dividend of 2 p.ct. on the consolidated ordinary stock (Longwood), and of £1 18s. 9d. p.ct. on the consolidated ordinary stock (Slaithwaite), is recommended for the December half year, being at the statutory rate. Interim statutory dividends of £2 3s. 9d. and £2 2s. 6d. respectively were paid for the June half. In October last, the Directors were approached on the question of the transfer of the undertaking to the Huddersfield Corporation. The shareholders have already been informed of the terms of an offer subsequently received from the Corporation; and they approved of it at an extraordinary meeting in November. The Corporation have deposited a Bill in Parliament to ratify the transfer upon the agreed terms.

STOCK MARKET REPORT.

THINGS on the Stock Exchange last week had a rather chequered career. At the opening the prospect was fairly promising, and orders on hand imparted an agreeable briskness to more than one market. But as soon as these demands were satisfied a coolness sprang up, and in several quarters dulness was the characteristic. Interruptions caused by tempestuous weather followed, and the next day or two were very quiet. However, Thursday brought an improvement in tone that lasted until the close, aided by more hopeful views of the labour position.

The gilt-edged market came through fairly well. Government issues were a little dashed at first; but recovered nicely. War Loans regained position, the 5 p.ct. marking 95 1/16, and Consols doing nearly as well. In Home Rails, buyers were shy at first; but stock was soon in brisk demand. Canadians were easy. In the Foreign Market, Mexican, Brazilian, and Chinese were in favour; but French Loans had a rather dull fit. In the Miscellaneous group, Rubber and Oil were a bit shaky at times, but closed steadier. Others for the most part were not remarkable either way.

Business in the Gas Market was about on a par with the previous week's in point of activity, and, as in that week, the minor undertakings were not overlooked. The tone on the whole was scarcely as firm. Gas Light ordinary was lowered a couple of points; but the preference was a fraction higher. South Metropolitan also receded; but South Suburban was the higher. Imperial Continental and Continental Union were very steady; but European was ⅛ lower. In the remoter world, Monte Video was ⅛ higher; but River Plate had a substantial fall.

Bargains done for cash during the week were as follows: On Monday, Bombay 6, British 32, Commercial 3½ p.ct. 61, European 12¾, Gas Light ordinary 67⅛, 67½, 68⅛, ditto maximum 55¼, 55½, Imperial Continental 119, 119⅜, 120, North Middlesex 10⅜, Oriental 105, Primitiva 35s., Grays and Tilbury, 7⅜, 7 7/16. On Tuesday, Commercial 4 p.ct. 64½, ditto 3½ p.ct. 61, Imperial Continental 119, 119⅛, 120, ditto debenture 73¼, 73½, Monte Video 9¾, North Middlesex 10⅜, Oriental 105, River Plate debenture 50, South Metropolitan 71, South Suburban 78. On Wednesday, Bombay 6⅛, Brentford "A" 77, ditto preference 79, Continental Union 49, Gas Light ordinary 66, 66⅛, 67, 67⅛, 67¼, 68, ditto maximum 56, Imperial Continental 119, 119¼, 119⅜, 119⅝, Monte Video 9⅛, 9⅜, North Middlesex 10⅜, Primitiva 37s. 6d., ditto preference 60s., South Metropolitan 71, Tottenham "A" 93½, ditto "B" 67½, Wandsworth "B" 74. On Thursday, Alliance and Dublin 50⅛, British 31¾, Gas Light ordinary 66, 66⅛, 67, Imperial Continental 119, 119⅛, 119⅝, 120, Monte Video 9¾, South Suburban 77, 78, Mid-Kent 18s., 19s., Rochester and Chatham 45⅜, 46¼. On Friday, Bournemouth preference 9⅝, British 31¾, 32, Continental Union 50⅛, European 12⅛, Gas Light ordinary 65⅞, 65¾, 66, 66¼, 66⅛, ditto maximum 56⅛, ditto preference 70, 70½, ditto debenture 56¼, Imperial Continental 119, 119⅛, 120, ditto debenture 73¼, 73⅛, Monte Video 9 15/16, 9⅞, Primitiva 34s., 36s. 3d., 37s. 6d., South Metropolitan 70, 71½, South Suburban 80.

In the Money Market, the position was subject to frequent fluctuations between ease and a good demand; the supply generally being sufficient to meet the latter. The Bank rate is 5 p.ct., as fixed on April 5, 1917.

ANTE-WAR PRICES AND DIVIDENDS, LATEST DIVIDENDS, AND LAST WEEK'S BARGAINS.

Issue. £	Shares.	When ex-Dividend.	Ante-War Dividend & Bonus p.c.	Last Dividend.	NAME.	Closing Prices, July 30, 1914.	Present Prices.	Lowest and Highest Prices of Bargains.
182,049	Stk.	Mar. 10	4	4%	Aldershot 4 p.c. Pref.	..	62–67	..
1,551,868	,,	April 8	2½	4¼%	Alliance & Dublin Ord.	59–64	48–50	50⅛
874,000	,,	July 10	4	4%	Do. 4 p.c. Deb.	76–79	61–63	..
230,000	5	April 22	7½	8%	Bombay, Ltd.	5⅞–6	6–6¼	6–6¼
60,000	10	Feb. 26	16	12%	Bournemouth Gas & Water { 10 p.c. B 7 p.c. Pref. 6 p.c. 4 p.c. Deb.	22–30	22–24	..
888,110	10	,,	7	7%		15–15½	10½–11½	..
115,000	10	,,	6	6%		13½–14	9½–9¾	9¾
159,740	—	—	—	4%		..	66–68	..
992,045	Stk.	Feb. 26	14	37/-	Brentford A Consolid.	261–266	76–79*	77
784,990	,,	,,	11	31/8	Do. B New	204–209	70–76*	..
55,000	,,	,,	5	5%	Do. 6 p.c. Pref.	109–111	75–t0*	79
221,460	,,	June 11	4	4%	Do. 4 p.c. Deb.	91–93	62–64	64½
317,880	,,	Feb. 26	11	8½%	Brighton & Hove Orig.	208–213	140–145	..
344,300	,,	,,	8	5¾%	Do. A Ord. Stk.	154–159	97–102	..
933,500	Stk.	—	5	5%	Bristol 5 p.c. max.	..	..	..
580,000	20	Mar. 26	12½	22/6	British	44–45	31½–32½	31⅞–32
120,000	Stk.	June 26	4	4%	Do. 4 p.c. Deb. Stk.	88–90	64–66	..
245,771	,,	,,	4	4%	Buenos Aires 4 p.c. Deb.	85–87	60–63	..
100,000	10	—	—	—	CapeTown & Dis., Ltd.	1½–2½	3⅜–4½	..
100,000	10	—	—	4½%	Do. 4½ p.c. Pref.	4–6	7½–8½	..
100,000	Stk.	June 26	4½	4½%	Do. 4½ p.c. Deb. Stk.	70–75	60–65	..
157,150	,,	Feb. 26	5	5%	Chester 5 p.c. Ord.	108–110	..	..
1,518,380	,,	Feb. 12	5/9/4	36/-	Commercial 4 p.c. Stk.	106–108	62–67	64½
550,000	,,	,,	5½	30/-	Do. 3½ p.c. do.	108–105	58–63	61
475,000	,,	June 11	3	3%	Do. 3 p.c. Deb. Stk.	69½–71½	51–53	..
800,000	,,	,,	4	—	Continental Union Ltd.	76–79	48–53	49–50½
900,000	,,	,,	7	—	Do. 7 p.c. Pref.	115–118	70–75	..
51,600	Stk.	Aug. 29	14½	12½%	Croydon A 10 p.c.	..	160–170	..
278,400	—	,,	11½	9½%	Croydon B and C 7 p.c.	..	135–140	..
492,270	Stk.	,,	6	6½%	Derby Con. Stk.	128–126	..	..
55,000	,,	—	4	4%	Do. Deb. Stk.	102–104	..	..
1,009,180	10	July 29	10	5/0	European, Ltd.	17⅛–18	12⅛–13½	12¾–13⅜
16,398,975	Stk.	Feb. 10	4/17/4	30/-	Gas Light and Coke { 4 p.c. Ord. 3½ p.c. max. 4 p.c. Con. Pref. 3 p.c. Con. Deb. 10 p.c. Bonds	98–102	66–67*	66⅛–6 7/16
2,600,000	,,	,,	3½	26 8		76–79	55–57*	56⅛–55⅝
4,062,235	,,	,,	4	4%		96–99	64–71*	70–70½
4,674,850	,,	June 11	8	8%		72½–74½	56–53	56½
180,000	,,	,,	10	10%		..	..	..
83,500	,,	Mar. 12	5	4½%	Hastings & St. L. 5 p.c.	..	60–65	..
258,740	,,	—	3½	22%	Do. 3½ p.c.	87–89	45–50	..
70,000	10	April 29	11	8%	Hongkong & China, Ltd.	16½–16¾	7½–8¾	..
86,600	Stk.	Sept. 12	9	9½%	Hornsey 7 p.c.	..	117–122	..
181,000	,,	Mar. 12	7½	6½%	Ilford A and C.	151–154	92–97	..
65,780	,,	,,	6⅔	48%	Do. B.	115–118	70–75	..
65,500	,,	June 26	4	4%	Do. 4 p.c. Deb.	92–94	62–65	..
4,940,000	,,	May 14	9	4½%	Imperial Continental	156–160	117–122	119–120
1,235,000	,,	Feb. 12	3½	3½%	Do. 3½ p.c. Deb. Red.	84–86	72–74*	73½–73⅝
235,342	,,	Mar. 12	6¾	6¾%	Lea Bridge Ord. 5 p.c.	119–121	93–98	..
2,498,905	,,	Feb. 26	10	49/6	Liverpool 5 p.c. Ord. { A B	211–213 146–148	..	..
306,088	,,	June 26	4	4%	Do. 4 p.c. Pr. Deb. Stk.	..	..	..
165,786	,,	Aug. 15	4½	4½%	Maidstone 5 p.c.	..	60–65	..
75,000	5	June 11	8	8%	Malta & Mediterranean Met. of Melbourne 4½ p.c. Deb.	4½–4¾	8½–8¾	..
250,000	100	April 1	4½	4½%		99–101	90–97	..
541,920	20	May 28	4	6/-	Monte Video, Ltd.	11½–12	9⅜–9⅞	9½–9⅞
1,875,892	Stk.	July 29	4½	8½%	Newcastle&Gatsh'd Con.	98½–99½	71½–72½	..
529,795	,,	June 26	8¾	8¾%	Do. 8½ p.c. Deb.	82–88	57–59	..
55,940	10	Feb. 26	7/14/0	1/0	North Middlesex 7 p.c.	14–15	9½–10½	10⅜
300,000	Stk.	May 14	8	8%	Oriental, Ltd.	117–122	103–106	105
60,000	5	Mar. 26	10	1/-	Ottoman, Ltd.	7½–7¾	4⅜–5½	..
60,000	50	Feb. 26	18	7½%	Porisea, Island B	128–131	78–83	..
100,000	50	,,	12	6½%	Do. C	118–121	60–65	..
249,980	5	April 29	8	—	Primitiva Ord.	5½–6	1⅞–2½	35/– 8 /6
499,960	5	June 26	5	—	Do. 5 p.c. Pref.	4⅞–5	3–3½	60/-
521,600	100	June 2	4	4%	Do. 4 p.c. Deb.	91–98	74–76	..
600,000	Stk.	July 31	4	4%	Do. ,, ,, 1911	..	46–49	..
346,198	,,	June 26	4	4%	River Plate 4 p.c. Deb.	85–87	48–52	50
150,000	10	May 14	6	6/-	San Paulo { 6 p.c. Pref. 5 p.c. Deb.	10½–11	7⅞–8½	..
125,000	50	July 1	5	5%		47–49	40–42	..
135,000	Stk.	Mar. 12	10	5%	Sheffield A	223–224	85–87	..
209,984	,,	,,	10	5%	Do. B	222–224	85–87	..
528,500	,,	,,	10	5%	Do. C	220–222	84–86	..
183,201	Stk.	Sept. 12	4	4%	Shrewsbury 5 p.c.	..	..	..
90,000	10	May 28	9	6/-	South African.	10½–11½	13–14	..
6,509,895	Stk.	Feb. 10	5/4/0	30/-	South Met. 4 p.c. Ord.	111–113	70–72*	70–71½
250,000	,,	July 12	—	5%	Do. Pref.	..	94–96	..
1,895,445	,,	July 10	8	8%	Do. 3 p.c. Deb.	72½–74½	54–56	..
224,820	,,	Feb. 26	8½	5¾%	South Shields Con. Stk.	157–159	114–116	..
952,795	,,	,,	6	3¾%	S'th Suburb'n Ord. 5 p.c.	114–116	73–81	77–80
197,558	Stk.	June 26	5	5%	Do. 5 p.c. Deb. Stk.	115–118	89–94	..
647,740	,,	May 14	8	8%	Southampton Ord.	99–102	67–70	..
120,000	,,	Feb. 12	7½	5¼%	Tottenham { A 5 p.c. B 3½ p.c.	135–138	92–97	93½
722,275	,,	,,	6	4%	District { 4 p.c. Deb.	115–117	67–69	67½
181,255	,,	June 26	4	4%		87–89	64–65	..
122,880	10	Dec. 30	5	—	Tuscan, Ltd.	5–6	1–2	..
149,900	10	July 1	5	5%	Do. 5 p.c. Deb. Red.	93–95	45–50	..
220,476	Stk.	Mar. 12	5	5%	Tynemouth 5 p.c. max.	108½–109	87–88	..
80,000	,,	Feb. 26	8½	55/-	Wandsworth, Wimbledon, and Epsom— Wandsworth A 5 p.c.	151–156	90–95	..
255,888	,,	,,	6¼	40/-	Do. B 3½ p.c.	129–134	70–75	74
108,075	,,	,,	—	38/6	Do. C	..	..	..
852,000	,,	,,	6¼	38/9	Wimbledon 5 p.c.	117–122	70–75	..
96,000	,,	,,	6¼	40/-	Epsom 5 p.c.	121–126	72–77	..
85,416	,,	June 26	3	3%	8 p.c. Deb. Stk.	86–89	50–52	..
140,865	,,	,,	—	33/6	New Ordinary	..	..	..

* Ex div.

Coke-Oven Gas for Town Purposes.—The Wath and Bolton Gas Board intend to abandon the manufacture of gas by their own plant, and to take a supply in bulk from the Manvers Main Colliery Company's coke-ovens. A similar arrangement between the Manvers Main Company and the Swinton and Mexborough Gas Board is under consideration.

Bexhill Water and Gas Company's Capital Issue.—On behalf of the Directors, Messrs. A. & W. Richards, of No. 37, Walbrook, are inviting tenders for 1479 £10 5 p.ct. preference shares in the Bexhill Water and Gas Company. The minimum price is fixed at £9 per share, at which figure the yield will be £5 11s. 1d. p.ct. Tenders should be sent in to Messrs. Richards by next Tuesday morning.

Salisbury Gas Light and Coke Company.—At the half-yearly meeting of the Company, the Chairman, in moving the payment of the full dividends, said they, in common with all gas undertakings, had passed through a year of trials and difficulties, with large increases in the cost of labour, coal, and other materials. To be enabled to pay the full dividends was most gratifying, and the outcome of very careful management on the part of their General Manager, Mr. W. Fielden. At an extraordinary meeting held later, more capital was authorized to be raised for the reconstruction of a very old dilapidated hand-stoking retort-house to a modern system of machine stoking, to plans and specifications of their Engineer and Manager.

Trading with the Enemy Amendment Act.—An Order has been made by the Board of Trade under the Trading with the Enemy Amendment Act, 1918, for the realization and distribution of the assets of Messrs. Henry Hill & Co., Ltd., of No. 73, Wicklow Street, W.C.1, gas mantle manufacturers. The Controller is Mr. A. E. Green, Nos. 100-104, Moorgate Station Chambers, E.C.

The Heywood Town Council have confirmed a recommendation of the Finance Committee to grant additional war bonuses, ranging from £25 to £10 per annum, to a number of their chief departmental officials.

The London Safety First Council have decided to invite the central lighting authorities to revert to pre-war conditions of lighting at the earliest possible moment, and to ask the Chief Commissioner of the Metropolitan Police to permit the Council to be represented at a suggested conference on the lighting of road obstructions.

During the past month, the London Coroners have held about a dozen inquests on people who have committed suicide by coal-gas poisoning. This fact was revealed at Islington, at an inquest on the body of a man found lying on his bed with a piece of gas tubing in his mouth. On the outside of his door he had fastened a notice: "Gas, do not bring in a light."

NOTICES TO CORRESPONDENTS, ADVERTISERS, AND SUBSCRIBERS.

No notice can be taken of anonymous communications. Whatever is intended for insertion in the "JOURNAL" must be authenticated by the name and address of the writer—not necessarily for publication, but as a proof of good faith.

COPY FOR ADVERTISEMENTS for the "JOURNAL" should be received at the Office NOT LATER than TWELVE O'CLOCK NOON ON MONDAY, to ensure insertion in the following day's issue.

Orders to Alter or stop PERMANENT ADVERTISEMENTS should be received by the FIRST POST on Saturday.

Wanted, For Sale, and Tender Advertisements, Six Lines and under (about 40 words) 3s.; each additional Line, 6d.

TERMS OF SUBSCRIPTION to the "JOURNAL."

		ONE YEAR.	HALF-YEAR.	QUARTER.
United Kingdom	Advance Rate:	28/-	15/-	8/8
	Credit Rate:	32/-	16/-	9/6
Abroad (in the Postal Union) Payable in Advance		32/6	17/-	10/-

In payment of subscriptions for "JOURNALS" sent abroad, Post Office Orders or Bankers' Drafts on London only are accepted.

All Communications, Remittances, &c., to be addressed to WALTER KING, 11, BOLT COURT, FLEET STREET, LONDON, E.C. 4.

Telegrams: "GASKING, FLEET LONDON." Telephone: Holborn 6857.

OXIDE OF IRON
FOR SALE OUTRIGHT, OR ON LOAN.

SPENT OXIDE
PURCHASED IN ANY DISTRICT.

GAS PURIFICATION & CHEMICAL CO., LTD.,
PALMERSTON HOUSE,
OLD BROAD STREET, LONDON, E.C. 2.

"VOLCANIC" FIRE CEMENT.
Resists 4500° Fahr. Best for Gas-Works.
ANDREW STEPHENSON, Gresham House, Old Broad Street, LONDON, E.C. "Volcanism, London."

FOR Supplies of SULPHURIC ACID,

ASK BERK.

F. W. BERK & CO., LTD.,
1, FENCHURCH AVENUE,
LONDON, E.C.3.
Works:
STRATFORD, LONDON.
MORRISTON (GLAM.).
Phone: 4032 Avenue. Tele: "Berk, Phone London."

BRITISH GAS PURIFYING MATERIAL.

ENGLISH BOG ORE AND NATURAL HYDRATED OXIDE OF IRON.
SPENT OXIDE BOUGHT.

BRITISH GAS PURIFYING MATERIALS CO., LTD.
(W. T. P. CUNNINGHAM, Chief Proprietor and Managing Director.)
13, ARCADIAN GARDENS, WOOD GREEN, LONDON, N. 22.
Telegrams: "Bripurimat, Wood, London."
'Phone: Palmer's Green 608.

MEWBURN, ELLIS, AND PRYOR.
CHARTERED PATENT AGENTS AND TRADE MARK AGENTS,
70, Chancery Lane, London.
Telegrams: "Patent, London." 'Phone: 243 Holborn.
And 3, St. Nicholas Buildings, Newcastle-on-Tyne.

J. & J. BRADDOCK (Branch of Meters Limited), Globe Meter Works, OLDHAM, and 45 & 47, Westminster Bridge Road, LONDON, S.E. 1.
WET AND DRY GAS-METERS, PREPAYMENT METERS, STATION METERS AND GOVERNORS.
REPAIRS RECEIVE PROMPT ATTENTION.
Telephones: 815 Oldham, and 2412 Hop, London.
Telegrams—
"BRADDOCK, OLDHAM," and "METRIQUE, LAMB, LONDON."

BENZOL PLANTS FOR GAS-WORKS.

BAGLEY, MILLS, & CO., Ltd.,
92, Victoria Street, Westminster, S.W. 1, Invite inquiries from all Gas-Works making 75 million cubic feet and upwards per annum.

ALDER AND MACKAY, LTD.
(ESTABLISHED 1850).
WET AND DRY METERS,
SLOT AND ORDINARY.
STREET LAMPS AND AUTOMATIC CONTROLLERS.

EDINBURGH.
(See p. 413.)

SULPHURIC ACID.

SPECIALLY prepared for the manufacture of SULPHATE OF AMMONIA.
SPENCER CHAPMAN & MESSEL, LTD.,
with which is amalgamated WM. PEARCE & SONS, LTD., Mark Lane, LONDON, E.C. Works—SILVERTOWN.
Telegrams—"HYDROCHLORIC, FEN, LONDON."
Telephone—1588 AVENUE (3 lines).

SULPHATE OF AMMONIA
SATURATORS and all LEAD and TIMBER WORK in connection with Sulphate Plants.
We Guarantee promptness with efficiency for Repairs.
JOSEPH TAYLOR AND CO., CHEMICAL PLANT ENGINEERS, BOLTON, LANCS.
Telegrams—"SATURATORS, BOLTON." Telephone 0848.

SEND your inquiries for Carburetted HYDROGEN AND BLUE WATER-GAS PLANT, also TAR DEHYDRATING PLANT and other GAS-WORKS APPARATUS to—
BALE AND HARDY,
99, VICTORIA STREET, WESTMINSTER, S.W. 1.

OXIDE OF IRON.
SPENT OXIDE BOUGHT.
BALE & CHURCH, LTD.
33, ST. MARY AT HILL, LONDON, E.C. 3.
Phone: Avenue 6680.

"TORTO" FIRE CEMENT.
BALE & CHURCH, LTD.
33, ST. MARY AT HILL, LONDON, E.C. 3.
Phone: Avenue 6680.

"KLEENOFF," THE COOKER CLEANSER.
Tins for Sale to Consumers.
In Bulk for Works Use.
BALE & CHURCH, LTD.
33, ST. MARY AT HILL, LONDON, E.C. 3.
Phone: Avenue 6680.

"FERROX." "FERROX." "FERROX."
A BRITISH Oxide Cheaper and Better than Bog Ore. 85 per cent. Water, 75 per cent. Ferric Hydrate.
For Sale outright or on Loan.
OXIDE LIMITED, Brentford, MIDDLESEX.

SPENCER'S Patent Inclined HURDLE GRIDS.

THE very best Patent Grids for Holding Oxide Lightly.
See Illustrated Advertisement, p. 410.

J. E. C. LORD, Ship Canal Tar-Works, Weaste, Manchester. Pitch, Creosote, Benzols, Toluol, Naphtha, Pyridine, all kinds of Cresylic Acid, Carbolic Acid, Sulphate of Ammonia, &c.

EXTENSIONS.—Gas-Works requiring Alterations or Additions should Communicate with FIRTH BLAKELEY, SONS, AND CO., LIMITED, 15, Park Row, Leeds, who make a Speciality of Gas Apparatus, Coke-Oven Plant, and Structural Steel Work. Inquiries Solicited. Satisfaction Guaranteed. Telephone No. 22579, LEEDS.

APPOINTMENTS, &c., WANTED.

TO Fire-Clay Retort and Brickmakers and Gas Engineers.—TRAVELLER, with Good Connection among Gas Companies, is OPEN TO AN ENGAGEMENT. No objection to part Office Work.
Address No. 6590, care of Mr. KING, 11, Bolt Court, FLEET STREET, E.C. 4.